Department of Primary Industries
Office of Water

PINNEENA Water Quality

PINNEENA WQ Version 11.1

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PINNEENA WQ Ver 11.1

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More information

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Acknowledgments

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2015). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the Department of Primary Industries or the user's independent adviser.

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PINNEENA Water Quality– Version 11.1

NSW's Water Quality Archive on DVD

"Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it."

Samuel Johnson 1709 – 1784

1.0 INTRODUCTION

In producing the original surface water PINNEENA CD-ROM in 1990, the then Department of Water Resources provided significantly enhanced access to its surface water data archive. It was hoped that the people planning, managing and developing NSW's water resources would benefit by having all the data both widely available, and at an appropriate technology level. While technology has advanced since the first PINNEENA, this form of data publishing still remains the most effective method of making such large amounts of data available although now a DVD is required to handle all the data provided.

The response from within Australia, and from overseas, encouraged that Department and its successors (currently the NSW Office of Water (NOW)) to continue to publish its surface water data on the PINNEENA CM (Continuous Monitoring) DVD and to produce PINNEENA GW (Groundwater) disks. The first of which was produced in 2006.

The Water Quality data collected from the Department of Water Resources days is now available in PINNEENA WQ (Water Quality) disks.

This DVD contains all of the data from the NSW Office of Water's Water Quality archive.

1.1 Importance of Water Data

According to the 1991 WMO/UNESCO publication "Water Resources Assessment - Progress in the Implementation of the Mar del Plata Action Plan and Strategy of the 1990s".

"...while the world's fresh-water resources are massive, they are not only unevenly distributed in both space and time but also have a finite limit in terms of practical utilisation. .... improving knowledge of the globe's water resources is indispensable for the well-being of mankind and for the protection of the environment. Reliable information on the state and the trends of water resources is a prerequisite for sound decisions on their sustainable management."

Our water resources around the world are under a number of pressures that drive the need for accurate long term water data. Everywhere the hydrological cycle is being modified quantitatively and/or qualitatively. Human activities such as; land use change, urbanisation, water storage, inter-basin transfer, irrigation and drainage have major impacts on both the quality and quantity of the resource. It is probable too, that global climate change will have an impact on water resources throughout the world.

Water data is particularly important in Australia, where evidence suggests that not only is the driest inhabited continent in the world, it also exhibits runoff variability greater than on any other continent except South Africa as shown in Table 1. It has been argued that this variability is not just a product of the variable rainfall but also a product of Australia's unique vegetation and its evapro-transpiration methods.

This variability in Australian conditions has been recognised with the Australian Water Resources Council stating that

" ... with regard to water resources - the flat topography, aridity, spatial and temporal climatic variability and biological distinctiveness have produced an aquatic environment to which much overseas research is inapplicable" (AWRC 1989)

Thus it is imperative that Australian authorities both collect and use data from within Australia when making natural resource related decisions. PINNEENA GW provides just such a resource.

Table 1 - World-Wide Flow Variability.

Area	Annual Flow Variation	Peak Flow Variation
World	0.43	0.28
Northern Africa	0.31	0.18
Asia	0.38	0.24
North America	0.35	0.25
South America	0.35	0.14
Europe	0.29	0.17
Southern Pacific	0.25	0.22
Southern Africa	0.78	0.46
Australia	0.70	0.45

Source: Finlayson and McMahon 1991

1.2 Water Quality

1.2.1 Surface water Quality

The quality of the waters in our rivers and aquifers is naturally influenced by inputs of salt and nutrients from the surrounding landscape and its geology. However, water quality can also be degraded by a wide range of factors including point source activities such as sewage discharge and mine wastes, and diffuse source activities such as land clearing and cultivation, urban and agricultural development.

The regulation of river flow by major storages and weirs and the extraction of water have also influenced the quality of water with many rivers receiving fewer flow events and floods which naturally clean and flush the river. While lowered water quality may only be a short–term problem for rivers, water in our groundwater systems has often been stored for thousands of years so any contamination has long-lasting impacts.

At a national level, the National Water Quality Management Strategy provides guidance on water quality planning and management and establishes guideline values for various water quality measures. In NSW, interim water quality objectives have been established in consultation with the community that help decision makers consider water quality in both big picture strategic planning such as Catchment Action Plans and Regional Strategies, and at the local level when assessing impacts of developments.

The Office of Water, through its water licences, also requires that contaminated irrigation or mining water not be returned directly to rivers and groundwater. The Office of Environment and Heritage licenses the discharge of sewage and other point source pollution.

Figure 1 a – Laboratory Testing

Figure 1b Sampling

1.2.2 Water Quality Data Collection

Water Quality data collection was carried out under various Water Quality Programs which is managed by Project Managers. There are about 350 Water Quality Projects and some of them existed for the period of the studies/ Projects. For example Liverpool Plains project was active between August 96 & Dec 97. GWYDIR Water Quality Project existed between July 2002 to Nov 2007 and similarly the Namoi Water Quality Project.

1.2.3 Typical Water Quality Project - Namoi Water Quality Project

The NSW Office of Water has a number of programs that assess water quality and try to improve it. One such program, the Namoi Water Quality Project, commenced in July 2002 and ran for a period of five years.

Basic water quality attributes were monitored on a monthly basis at a total of 29 sites. Monitoring of agricultural chemical residues was undertaken at sites located in the main dryland and irrigated cropping areas of the Namoi valley.

Results indicate that good agronomic practices in conjunction with the management of riparian vegetation to reduce stream bank erosion provide simple and effective means to improve water quality in the long term.

Read the final report Namoi Water Quality Project 2002-2007 (PDF 1.5 MB).

1.2.4 Waterwatch NSW

Waterwatch NSW is a community based program in water quality monitoring. The aim of the program is to have the public and local organisations involved in regular water quality monitoring activities to inform government, the community and natural resource management organisations on the health of our local waterways.

To assist Waterwatch groups, the Office of Environment and Heritage in partnership with the Commonwealth Government developed new resource material and a new Waterwatch database for users which were released in 2010. These resources include manuals, guides and posters that can assist groups in the field on water quality sampling methods and techniques.

The Waterwatch database allows Waterwatch groups to enter water quality monitoring results from their local area or chosen site. The information is then used by Local Land Services and other organisations to develop an indication of water quality health in a particular area. The information collected may also provide an indication of upstream health and what other factors may be impacting the health of a lake, river or estuary.

1.2.5 Groundwater Quality

While groundwater occurs everywhere below the ground surface. It varies greatly however in quality, quantity and depth depending on host rock type, the nature of the overlying soils and the rainfall of the region.

By its nature, groundwater is often less susceptible than surface water to short term depletion and contamination. However, if excessively depleted or polluted, there is often little that can be done to restore a groundwater system to its natural state.

In NSW, the quality of groundwater varies dramatically from region to region. One measure of quality is the level of natural salt content present in groundwater. As stated before salinity levels can range from that of rainwater to more than 10 times that of sea water.

The lowest salinity groundwater can generally be found in the large unconsolidated alluvial systems associated with the major westward draining rivers. Many coastal sand dune systems also contain low salinity water, as do the consolidated sediments of the Great Artesian Basin which occur at depth in the north west of the State. Figure 3 shows groundwater availability and salinity across NSW.

Groundwater quality is known to be deteriorating in many parts of the State through contamination from human activities such as urban and rural development, use of fertilisers and pesticides, leaking sewage pipes, septic tanks, tip sites, mining and seepage from contaminated lands.

Figure 2 Groundwater Quality Sampling at a Bore

Also, surface water systems into which groundwater flows, such as wetlands, may have environmental values and require the incoming waters to be of a very high quality. The protection of groundwater resources in such areas is an important aspect of total water management.

Table 3 Types of Groundwater Quality Monitoring Undertaken in NSW

Area	No. bores	Type of analysis	Purpose
Alluvium	170	Major cat ions and anions	WSP
	390	Field EC	Salinity management
	75	Field EC	WSP
	2	Major cat ions and anions	Background sampling in CSG areas
Porous Rock	17	Major cat ions and anions	Background sampling in CSG areas
	75	Field EC	WSP
Fractured Rock	25	Field EC	WSP
Coastal sands	75 6	Major cat ions and anions	WSP Salt water intrusion

When groundwater is extracted and used for irrigation, proper consideration must be given not only to the quality of the waters but also to the compatibility of the water with respect to the soil and crops on which it is to be applied. If not, it could cause a breakdown in soil structure, salinisation of the root zone, leaching of salts to underlying groundwater and, ultimately, the movement of salts into creeks and rivers. Groundwater that has a high sodium adsorption ratio, for instance, should not be used on sodic soils. Saline drainage flows need to be managed to prevent contamination of surface waters.

Similar problems occur in the bore drains used to distribute water from flowing bores in the Great Artesian Basin. Here the continual use of low gradient drains that pass through sodic soils with limited leaching capacity has caused a build-up of soil salinity in the immediate vicinity of the drains. This has often caused native vegetation to die off and be replaced with non-native salt-tolerant species.

There is only a recent awareness of the significant role played by groundwater as a component of the physical environment. This awareness has resulted from the observation of the impacts of rising and falling water levels. A consequence of rising water levels is the emergence of poor quality water into streams, wetlands and soils, while falling water levels have resulted in the drying of some wetlands and many of the mound springs of the Great Artesian Basin, as well as a reduction in base flows to many streams. Many surface water ecosystems are largely dependent on groundwater, and their protection is directly related to its protection.

In many situations, the naturally poor quality of groundwater may diminish the perceived need for protection, unless the significance of groundwater as a support to more sensitive water environments is taken into account. Contamination of brackish aquifers, particularly where they are highly permeable, can lead to serious degradation of surface water environments receiving such groundwater discharges. Consequently, the environmental value of groundwater can in some cases be the critical factor which determines protection measures.

1.2.6 Threats to Groundwater Quality

Unlike rivers, which flow in defined channels, groundwater is present everywhere beneath our feet. Many of our activities, therefore, pose potential threats to the quality of our groundwater resources. Many low lying sites were progressively filled in with industrial and urban waste in the first half of this century in the industrial centres of Sydney, Newcastle and Wollongong, causing contamination of the groundwater. Contaminated groundwater systems can pose a threat to other connected ecosystems. Wetlands, for example, are often degraded by groundwater that has become polluted through the burial of waste in the immediate catchment.

Generally, contamination can be described as coming from either ‘point’ sources or ‘diffuse’ sources. Point source contamination may range from land fill sites (for example domestic tip sites and industrial land fill sites), to animal-based waste from abattoirs, cattle feed lots and piggeries. Diffuse source contamination includes the spreading of fertilisers onto agricultural land, urban runoff and the fallout from industrial smoke stacks.

Along with threats from surface activities, there is a very real danger that pumping large volumes of groundwater will result in deterioration in water quality where poor quality water is drawn into aquifer containing high quality water.

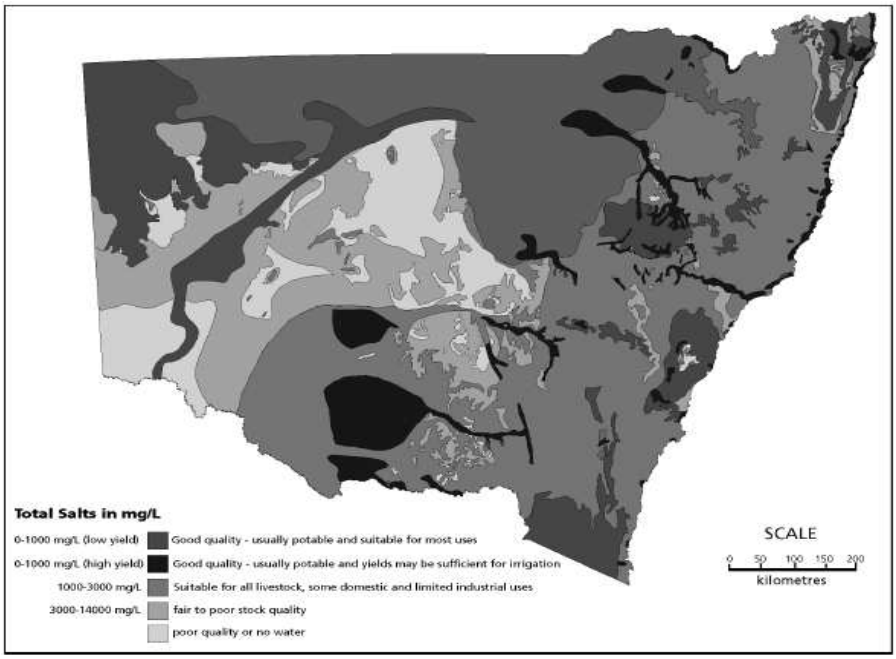
Total Salts in mg/L
0-1000 mg/L (low yield)
Good quality - usually potable and suitable for most uses
0-1000 mg/L (high yield)
Good quality - usually potable and yields may be sufficient for irrigation
1000-3000 mg/L
Suitable for all livestock, some domestic and limited industrial uses
3000-14000 mg/L
fair to poor stock quality
poor quality or no water
SCALE
0 50 100 150 200
kilometres

Figure 3 – Groundwater Salinity Map

If groundwater becomes polluted, it is difficult or impossible to clean up completely. The slow rates of groundwater flow and low microbial activity limit any self-purification.

Processes which take place in days or weeks in surface water systems may take decades to occur in groundwater. In addition, the costs of remediating groundwater systems are very high. It is, therefore, better to prevent or reduce the risk of groundwater contamination than to deal with its consequences.

1.3 Data on Pinneena WQ

NOW monitors (manually & using probes etc.). around 300 sites Water Quality on an Annual basis. Manually collected samples are tested at Laboratories and Archived in KiWQM database. Water Quality collection and testing started in the 1900's and there are about 24,500 sites that has WQ data of which 18,500 are sampled from Ground Water Bores. Many bores have only single reading (e.g.: GW000001 has data for 26/7/1994 only). There are about 460 sites that have continuously monitored WQ data which has Electrical Conductivity, Temperature, pH, Turbidity, Dissolved Oxygen etc.

Based on records, continuously monitored Temperature data started in 1962 at Snowy River @ Jindabyne. Continuously Monitored EC data started in 1972 at Brogo River d/s Brogo Dam.

1.3.1 KiWQM – Database for Manually Monitored Bores

A main focus of the implementation of the new system for managing water quality samples was the seamless integration with the existing NOW systems, in particular Hydstra, which is applied for handling all time series data. The KiWQM client will be accessible for users through Hydstra within the Hydstra application menu. This will allow users to work on water quality and sample data (KiWQM) and time series data (Hydstra) starting from the same platform. In addition KiWQM data can be exported directly to the Hydstra WQ warehouse where it can then be treated as any other data sources and exposed to Hydstra functionality.

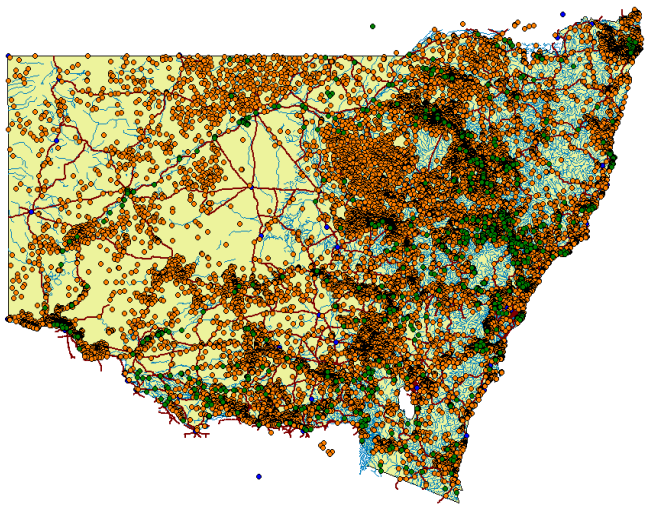

Figure 4 Water Quality Monitoring Locations

1.4 Pinneena Updates

The PINNEENA DVD version numbers reflects both the version of HYDSTRA software on the DVD and the data updates. So PINNEENA DVD N.3 indicates that Version N of HYDSTRA is being used and that it is the 3rd data update in this series. If the next PINNEENA DVD still used Version N of HYDSTRA, the next PINNEENA DVD version number would be N.4.

Future updates of PINNEENA DVD will take place at irregular intervals (typically every 2 years) depending on:

- Product demand
- Data quality changes
- Software enhancements

1.5 License Agreement

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2. DISCLAIMER

2.1 Data Analysis

This data reflects the natural conditions under which it has been collected. There are a number of factors that should be considered when any extrapolation or prediction based on this data is carried out.

2.1.1 Hydrologic Trends

The use of hydrologic information including groundwater levels that is representative of long term conditions to support natural resource management decisions is very important in Australia because of the extremely variable climatic conditions that occur. Marked shifts in climate regime, known as secular changes, also occur from time to time. These climate characteristics are most pronounced in south-eastern Australia, and particularly in NSW.

In NSW, rainfall, stream flow and other hydrologic data show that from about 1948 to the late 1990s the climate was significantly wetter on average than in the period from about 1890 to 1948. In terms of rainfall the increase is about 15% while in terms of streamflow increases of as much as 60% were noted. In addition, droughts tended to be much shorter during the period 1948 to 1990 than they were between 1890 and 1948.

While data was sparser in the 19th century, it is evident that in about 1890 an opposite shift to that of 1948 occurred, and that other shifts up and down of varying magnitudes and durations occurred before 1890 (based on data from Lake George). Again from the late 1990s to 2010 the climate was significantly drier. Whether this trend will continue and/or for how long is yet to be determined. It is therefore apparent that secular changes in climate, either up or down, can occur at any time.

2.1.2 Climate Zones in NSW

NSW covers a number of seasonal zones. In the inland there are three main rainfall zones. In the south of state the rainfall pattern is winter dominated (the Murray and Murrumbidgee basins), while in the north of the state the rainfall pattern is summer dominated (the Border Rivers, Gwydir and Namoi basins). The Macquarie and Lachlan basins are in a transition zone between winter dominated rainfalls in the south to summer

dominated in the north. As always there are exceptions to the rules. For example with the Monaro area around Cooma (in the Murrumbidgee basin), any rainfall it gets is mainly in spring (Figure 8).

On the coast and eastern side of the ranges local orographic effects complicate the situation. Dorrigo, Laurieton, Comboyne, the Barrington Tops, the Illawarra and around Gosford are examples of areas where local orographic effects are strong. On the North Coast, north from about Grafton, there is a winter peak in rainfalls due to onshore south-easterlies as well the usual summer rainfall peaks. The Hunter and the Warragamba catchments exhibit a mixture of coastal and inland characteristics (stronger in the Hunter).

The climatic conditions in these zones and the various physical factors impact on the timing and amount of rainfall that are available to provide natural recharges to aquifers. As indicated earlier this could also be being impacted by secular changes in the weather.

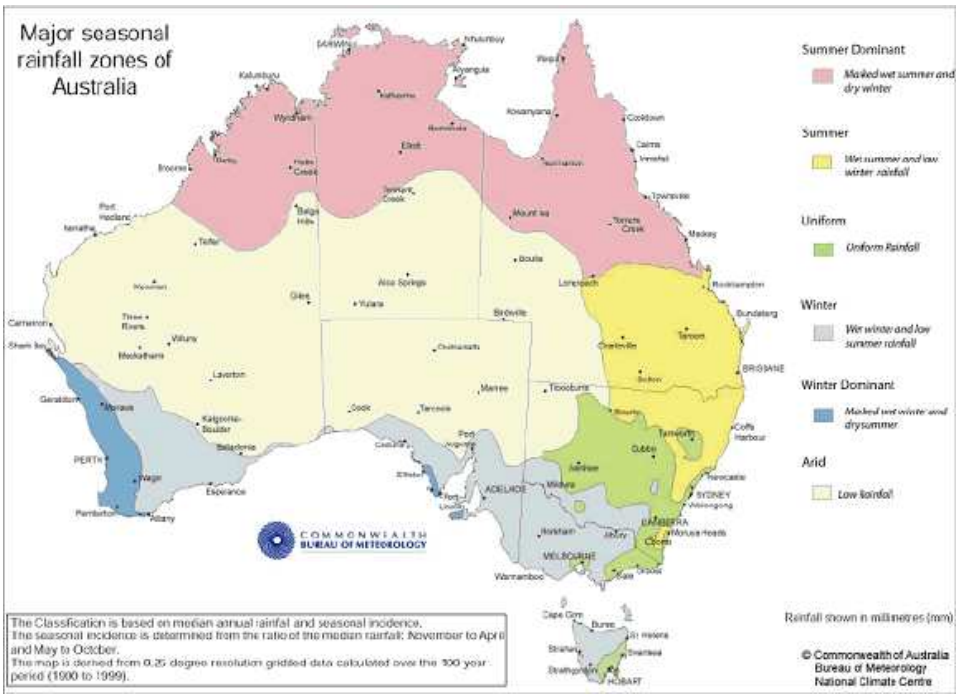

Major seasonal rainfall zones of Australia
Summer Dominant
Marked wet summer and dry winter
Summer
Wet summer and low winter rainfall
Uniform
Uniform Rainfall
Winter
Wet winter and low summer rainfall
Winter Dominant
Marked wet winter and dry summer
Arid
Low rainfall
COMMONWEALTH BUREAU OF METEOROLOGY
The Classification is based on median annual rainfall and seasonal incidence.
The seasonal incidence is determined from the ratio of the median rainfall: November to April and May to October.
This map is derived from 0.25 degree resolution gridded data calculated over the 100 year period (1900 to 1999).
Rainfall shown in millimetres (mm)
© Commonwealth of Australia Bureau of Meteorology National Climate Centre

Figure 5 Rainfall Zones in Australia

2.2 Data Quality

The data on this DVD is as recorded both by instruments in the field and by manual dipping . Gross editing and error correction has been undertaken where possible. is included on the archive or the PINNEENA WQ DVD. Therefore the NSW Office of Water can make no guarantee that data at sites are necessarily fully correct.

2.3 Data Quality Assurance

PINNEENA WQ contains vast quantities of water quality information, some of which is over a hundred years old. While the Department continues to refine and correct data, because of the historic nature of the archive there will be errors and omissions in the data. To assist us to improve our data quality we would ask you to report any errors or omissions that you may find.

The Department is working to quality certify its water quality data collection activities and it is looking to undertake continuous quality assurance reviews of its water quality

monitoring data. Your feedback on any data or software errors in PINNEENA WQ will assist with this and contribute to improved data quality in future releases.

We are also interested in hearing of your impressions, experiences and opinions on all aspects of PINNEENA WQ, including the data, the software and the documentation,. Included with this manual is an evaluation form which we would like you to complete and return once you have explored PINNEENA WQ and have some experience with its use,.

3.0 SETTING UP PINNEENA WQ 11.1. DVD

3.1 What you need to use the PINNEENA DVD

PINNEENA is produced to ISO 9660 standards and requires an IBM compatible computer with a hard disk and DVD reader. PINNEENA will run on Windows 2000, XP, Vista, Windows 7, and Windows 8 and on both 32 and 64 bit versions of these operating systems where available. It will not run on Linux or older versions of Windows.

This users' guide assumes you are familiar with basic commands and procedures for the Windows operating system. Knowledge of surface water data and HYDSTRA are also considered desirable to utilise PINNEENA to its fullest potential, but they are not essential.

Help is provided for using the data and tools on the PINNEENA DVD both directly from the programs themselves, and in this guide. Further advice if necessary can be obtained by contacting one of the numbers listed in the Product Support section 1.5

3.2 Computer Requirements

The minimum configuration for running Pinneena are as follows (i.e. it still currently runs on a system with the following configuration, albeit very slowly): Intel Pentium II 500

- 640 Mb RAM
- 50 Mb free disk space
- SVGA Monitor (800*600)
- Microsoft compatible mouse
- DVD Reader
- Windows 2000

However the recommended minimum configuration for reasonable performance would be along the lines of the following:

- Intel Pentium 4
- 1 Gb RAM
- 200 Mb free disk space
- XVGA Monitor (1024*768)
- Microsoft compatible mouse
- DVD Reader
- Windows XP

Obviously the faster the CPU and the higher the amount of RAM the better the performance will be. All modern machines will run Pinneena. DVD speed is generally not an issue for most modern systems.

A minimum of 50 megabytes of free hard disk storage is required on the PC for temporary files but more is better for PINNEENA and system performance. Pinneena has been tested in the following versions of Windows (as per table below).

This version of PINNEENA will not run under any version of Linux, UNIX, DOS, Windows 3.X, Windows 95/98 or Windows NT 4.

PINNEENA outputs text and high resolution graphics and a XVGA screen at 1024 by 768 pixels is the recommended minimum.

Table 4 Operating Systems where Pinneena can be used

Windows OS Version	32bit	64bit
2000	√	
XP	√	
Vista	√	√
7	√	√
8 - 8.1	√	√
10		√

PINNEENA will also produce graphical and textual outputs on any Windows supported output device. It is also possible to use the Windows clipboard's cut and paste features to capture this output and paste into other applications eg MS Word.

Note: The outputs from PINNEENA can contain large amounts of data. If plots are produced with missing or incomplete traces it is likely that the printer requires more memory. This is generally not an issue with modern PCs and printers.

3.3 Pre-Installation checks

The PINNEENA DVD will run successfully on PC's running Windows 8 and 8.1, Windows 7, Vista, XP, or Windows 2000. However, please note that we have discovered that some systems may have trouble reading DVD +R discs while others may have problems reading DVD -R discs.

This issue is generally evidenced by not being able to fully install the PINNEENA software due to read errors from the disk.

PINNEENA DVD is produced in both versions. If you have any troubles reading the DVD please inform us and send the DVD back to the Parramatta office where a replacement will be dispatched back to you.

If the disk has been damaged and is unusable then you will be charged a replacement fee.

3.4 PINNEENA DVD Set-up

There are some basic things you may need to do before you can successfully run the DVD on some older systems. The installation program checks that these things have been done and flags any areas of concern. However, it is up to you to make any necessary changes.

Insert the PINNEENA disc in the DVD reader.

Start Windows Explorer and find the SETUP.EXE file on the home/root directory level of the DVD.

Run the SETUP.EXE program. This will create the entries in the Start Menu needed to run PINNEENA.

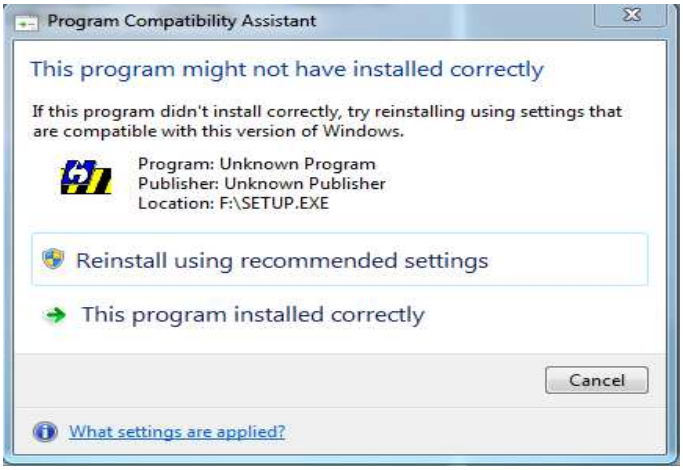
The PINNEENA DVD must be in the DVD reader for the system to work.

3.4.1 Installation in Windows 7 and Windows 8

There can be some issues with installing the PINNEENA software under Windows 7 and/or Windows 8 due to the UAC (User Access Control) features of these operating systems. It is generally less of an issue in Windows 8 as Microsoft recognised the problems from Vista and have relaxed many of the restrictions and automated the responses.

However there are still some common problems that can occur with either version:

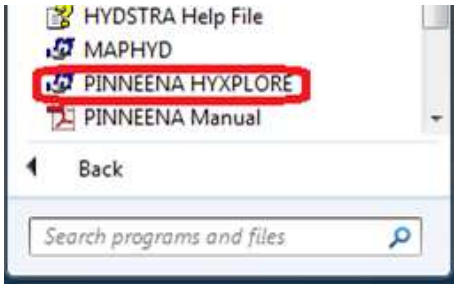
1. You may be blocked from installing the program
2. A program may fail to operate due to lack of write permissions in the \Temp directory (HYDSTRA writes temporary files to the \Temp and \Temp\Temp directories and requires write permissions at this level)
3. Issues with accessing the HELP file contents
4. When the program has finished installing you may receive the following error shown below. Select Reinstall using recommended settings.


Program Compatibility Assistant
This program might not have installed correctly
If this program didn't install correctly, try reinstalling using settings that are compatible with this version of Windows.
Program: Unknown Program
Publisher: Unknown Publisher
Location: F:\SETUP.EXE
Reinstall using recommended settings
This program installed correctly
Cancel
What settings are applied?

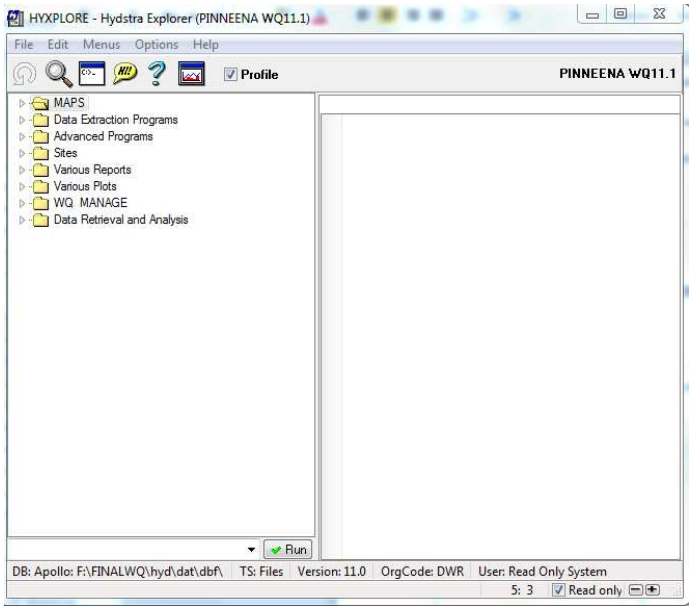
To make the process more straight forward, we recommend that you are logged on as an administrator to install new programs. However for reasons best known to Microsoft, even though you may be logged into an administrator account, the install jobs don't normally run with admin privileges.

We suggest that you try to install PINNEENA first. If this is successful, then run a test program such as HYCSV, as shown below.

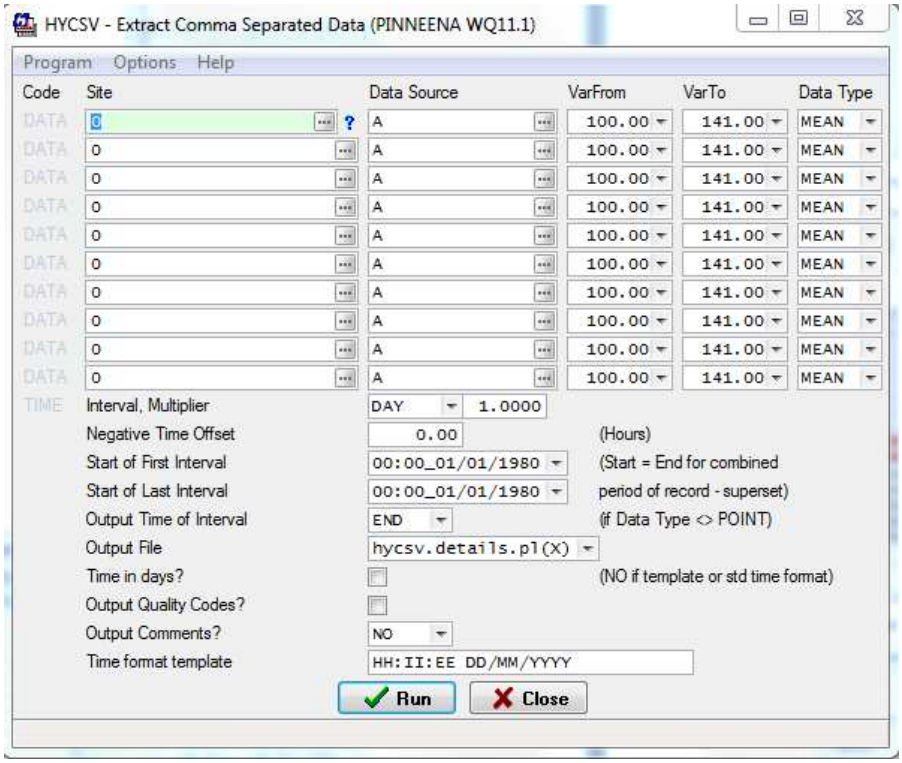
Go to the Start Menu > All Programs > Pinneena 10.1 > Select Pinneena Hyxplore,



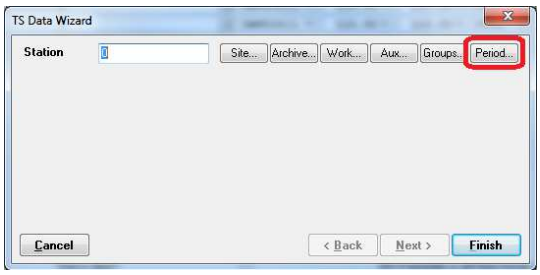
Within Hyxplore > Type HYCSV > Click on the Run button.



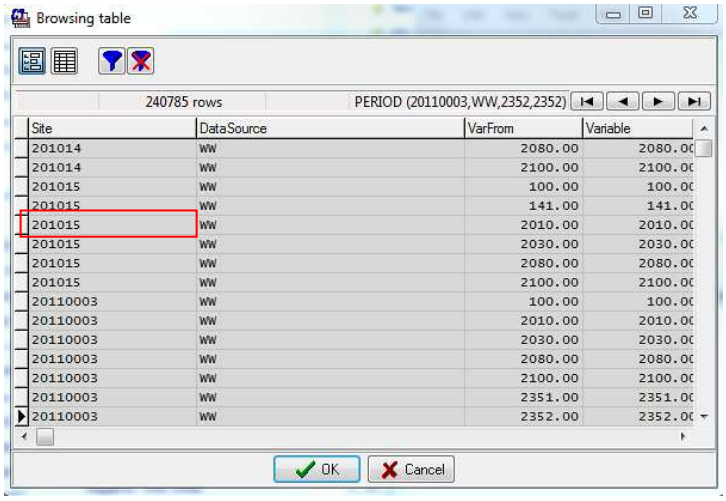
To select a Site click on the button where the ? is (marked red in the picture below).


HYCSV - Extract Comma Separated Data (PINNEENA WQ11.1)
Program Options Help
Code Site Data Source VarFrom VarTo Data Type
DATA 0 A 100.00 141.00 MEAN
TIME Interval, Multiplier DAY 1.0000
Negative Time Offset 0.00 (Hours)
Start of First Interval 00:00_01/01/1980 (Start = End for combined
Start of Last Interval 00:00_01/01/1980 period of record - superset)
Output Time of Interval END (if Data Type <> POINT)
Output File hycsv.details.pl(X)
Time in days? (NO if template or std time format)
Output Quality Codes?
Output Comments? NO
Time format template HH:II:EE DD/MM/YYYY
Run
Close

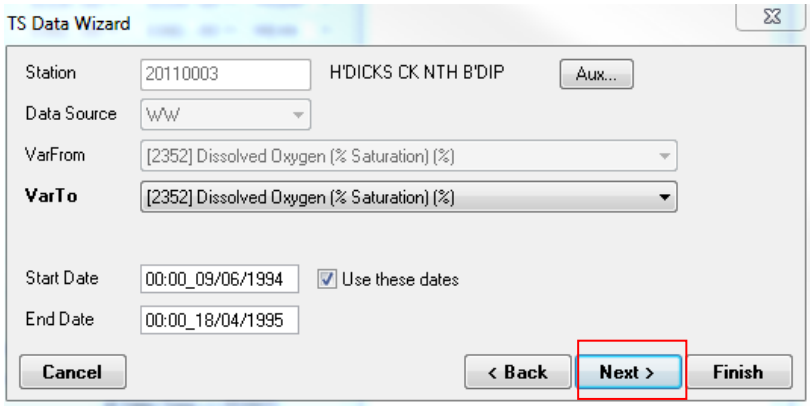
Click on the Period button.



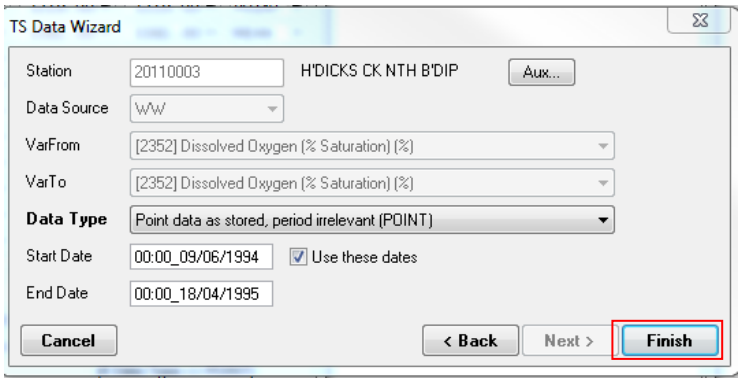
The Browsing table well then appear. Click on 21910062 site > Then click on OK.



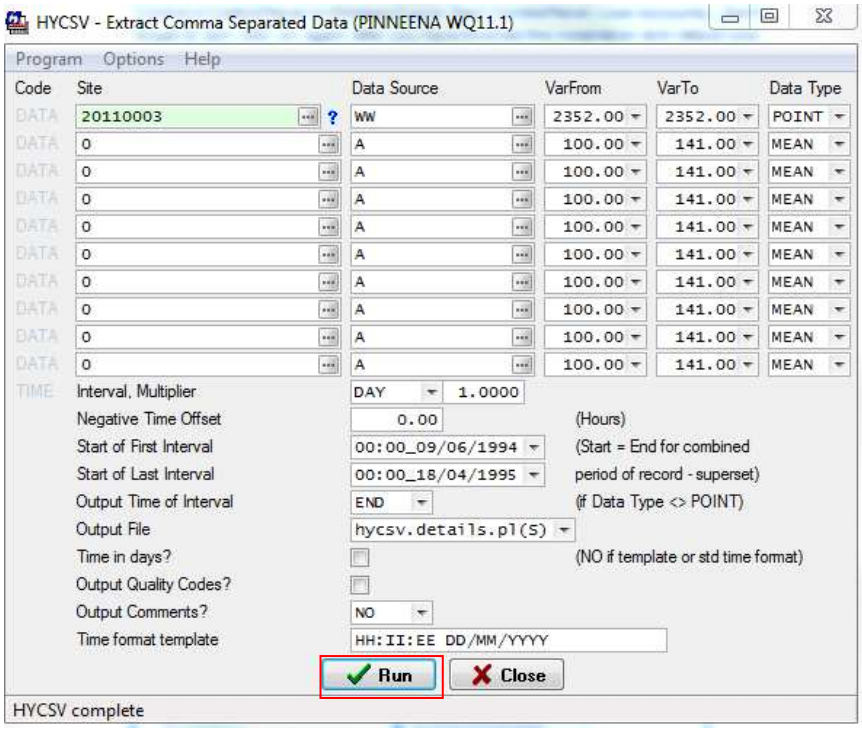
The TS Data Wizard window will now appear. Click on the Next button.



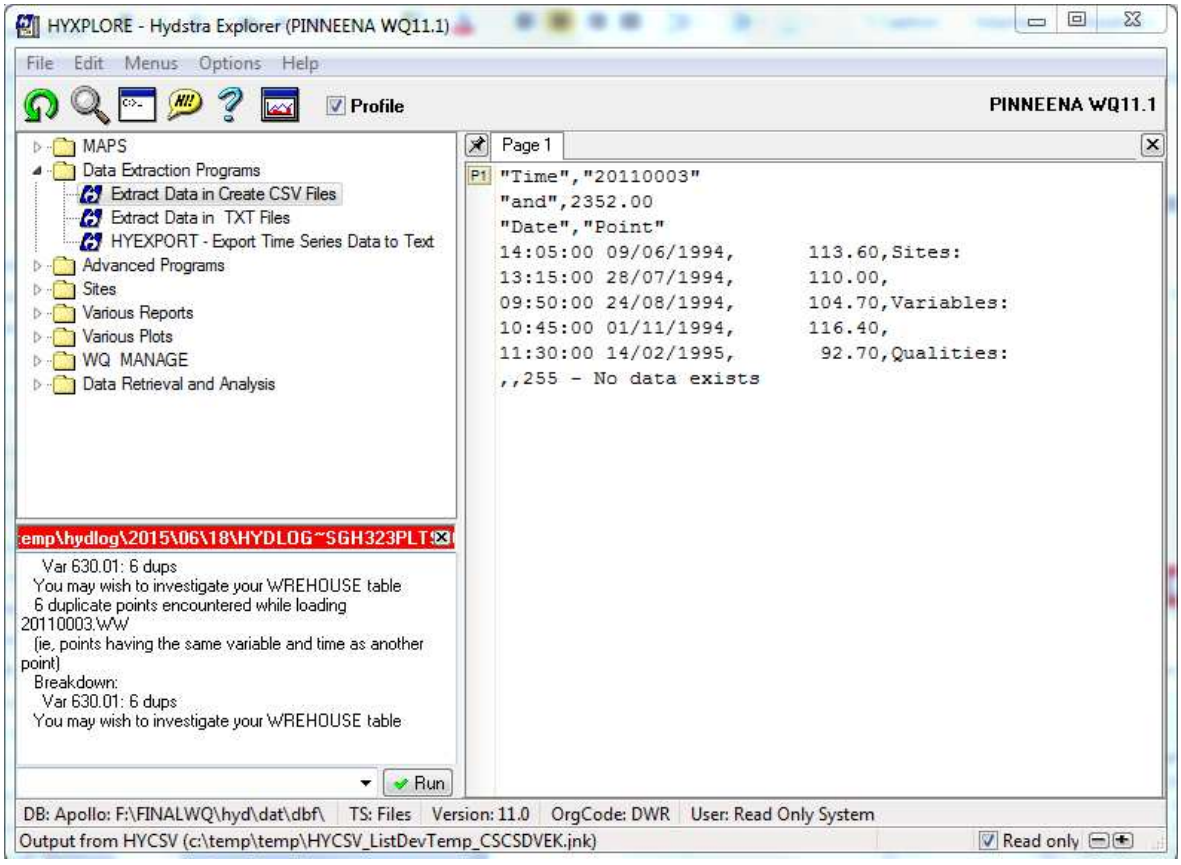
The Data Type will now appear on the TS Data Wizard window. Click on the Finish button.



You will be bought back to the HYCSV program. Click on the Run button.


HYCSV - Extract Comma Separated Data (PINNEENA WQ11.1)
Program Options Help
Code Site Data Source VarFrom VarTo Data Type
DATA 20110003 WW 2352.00 2352.00 POINT
DATA 0 A 100.00 141.00 MEAN
TIME Interval, Multiplier DAY 1.0000
Negative Time Offset 0.00 (Hours)
Start of First Interval 00:00_09/06/1994 (Start = End for combined
Start of Last Interval 00:00_18/04/1995 period of record - superset)
Output Time of Interval END (if Data Type <> POINT)
Output File hycsv.details.pl(S)
Time in days? (NO if template or std time format)
Output Quality Codes?
Output Comments? NO
Time format template HH:II:EE DD/MM/YYYY
Run
Close
HYCSV complete

The HYCSV program will now return the respective parameter data for the 20110003 Site.

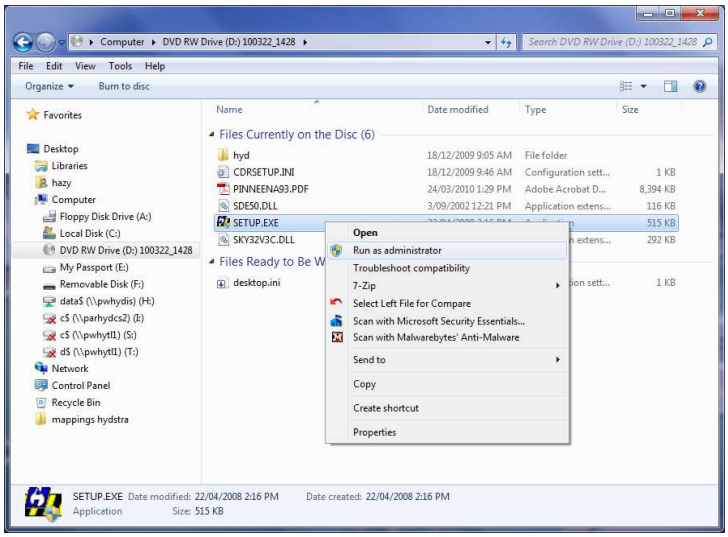


You have successfully run a test with the HYCSV program.

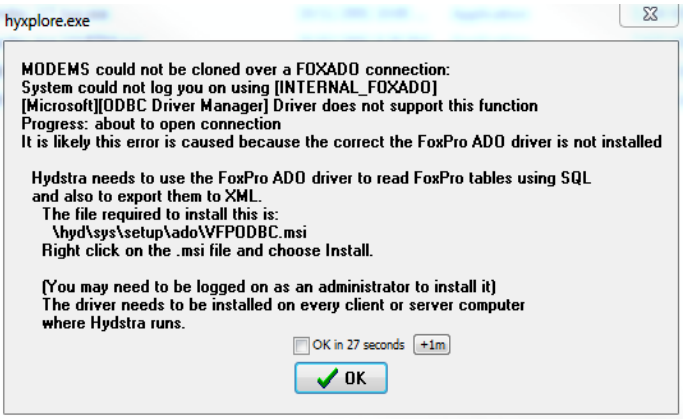
This writes a file to the \Temp\Temp directory. If you are successful in both installing PINNEENA and running the program please ignore the following.

Otherwise, if you are allowed/able to, you suggest that you briefly turn off the User Access Control in Control Panel (in Windows 8 go to Start | Control Panel | User Accounts). Don't forget to turn UAC on again after you have finished the installation and reboot your computer.

While logged in as an administrator and with the UAC turned off use Window Explorer and right click on the PINNEENA SETUP.EXE file. Then select “Run as administrator”.



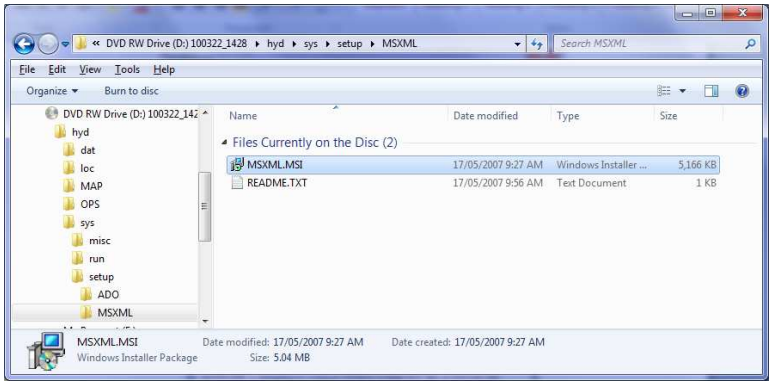
Even with all this other messages may occur which indicate issues with the installation. These messages can include:


hyxplore.exe
MODEMS could not be cloned over a FOXADO connection:
System could not log you on using [INTERNAL_FOXADO]
[Microsoft][ODBC Driver Manager] Driver does not support this function
Progress: about to open connection
It is likely this error is caused because the correct the FoxPro ADO driver is not installed
Hydstra needs to use the FoxPro ADO driver to read FoxPro tables using SQL
and also to export them to XML.
The file required to install this is:
\hyd\sys\setup\ado\VFPODBC.msi
Right click on the .msi file and choose Install.
(You may need to be logged on as an administrator to install it)
The driver needs to be installed on every client or server computer
where Hydstra runs.
OK in 27 seconds
+1m
OK

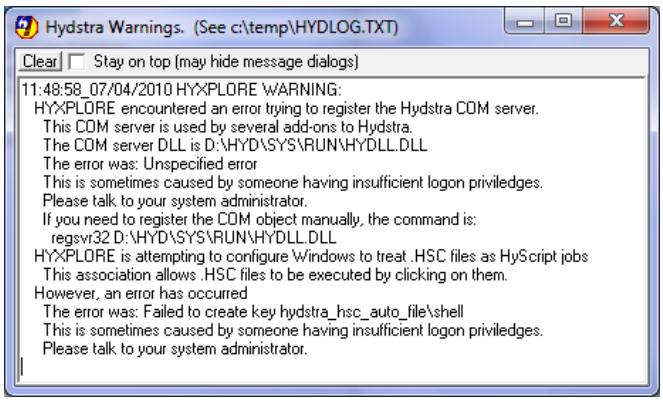
Open Windows Explorer and browse the PINNEENA DVD. Find and install the file from the CD as indicated ie \hyd\sys\setup\ado\VFPODBC.msi

hyxplore.exe
Hydstra experienced some unexpected difficulties validating D:\hyd\dat\ini\HYXPLORE.XML
EOleSysError raised:
Class not registered, ClassID: {88D969C0-F192-11D4-A65F-0040963251E5}
Hydstra needs to use Microsoft XML Core Services 4.0, SP 2
The file required to install this is:
\hyd\sys\setup\msxml\msxml.msi
(You may need to be logged on as an administrator)
OK in 9 seconds
OK

Open Windows Explorer and browse the PINNEENA DVD. Find and install the file from the CD as indicated i.e. \hyd\sys\setup\msmxl\msxml.msi



Another message that may appear is shown below.

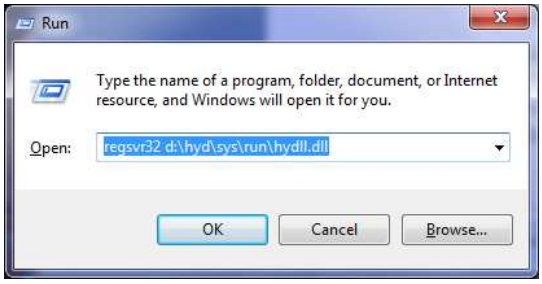

Hydstra Warnings. (See c:\temp\HYDLOG.TXT)
Clear
Stay on top (may hide message dialogs)
11:48:58_07/04/2010 HYXPLORE WARNING:
HYXPLORE encountered an error trying to register the Hydstra COM server.
This COM server is used by several add-ons to Hydstra.
The COM server DLL is D:\HYD\SYS\RUN\HYDLL.DLL
The error was: Unspecified error
This is sometimes caused by someone having insufficient logon priviledges.
Please talk to your system administrator.
If you need to register the COM object manually, the command is:
regsvr32 D:\HYD\SYS\RUN\HYDLL.DLL
HYXPLORE is attempting to configure Windows to treat .HSC files as HyScript jobs
This association allows .HSC files to be executed by clicking on them.
However, an error has occurred
The error was: Failed to create key hydstra_hsc_auto_file\shell
This is sometimes caused by someone having insufficient logon priviledges.
Please talk to your system administrator.

This requires that you select Start | Run... and enter the following text

Regsvr32 d:\hyd\sys\run\hydll.dll

Where d: = the drive letter of your DVD drive

This is shown in the following screen shot:



Also, if you have problems with accessing the Help file contents, ie you see the menu on the left hand side but it returns no content in the right hand panel then please follow the instructions below:

If this occurs you will need to run the CHM.REG file from the DVD in the HYD\SYS\RUN directory.

Again you have to be logged in as an administrator; then use Windows Explorer to find this file on the DVD, right click on it, select run with admin privileges. Again it may be required to do this with UAC turned off.

3.5 Product Support

If you have a question about the PINNEENA DVD or any of the data and you cannot find the answer in this guide, or if you would like to take advantage of the NSW Office of Water ' services to analyse or validate data sets used, please contact the Water Data Systems Team of the NSW Office of Water in Sydney on the following:

Phone: 02 8838 7874

Fax: 02 8838 7854

Email: waterinfo@water.nsw.gov.au or waterinfo@dpi.nsw.gov.au

Support for general questions about Groundwater data can also be obtained from the Office's hydrogeological centres in:

PENRITH Tel: 02 4729 8128 Fax: 02 4904 2503	**Deniliquin** Tel: 03 5898 3948 Fax 03 5881 3465
Newcastle Tel: 02 49042565 Fax: 02 4904 2503	**Wollongong** Tel: 02 42249746 Fax: 02 42249650

3.6 Acknowledgement

Kisters Pty Ltd owns the copyright to the HYDSTRA software used on the PINNEENA DVDs. This software is used under license.

4.0 PINNEENA DATA

4.1 Data Available

PINNEENA contains the majority of the information stored in the NSW Office of Water's (NOW) Surface water & Water Quality Archive. This version of PINNEENA contains the following data in its archive files (this does not include data that has been collected but not yet processed):

- Continuously Monitored EC, Temp, Turbidity, pH data approx. 500 Stream Gauging Stations.
- Continuously Monitored EC, Temp, Turbidity, pH data approx550 Groundwater bores.
- Manually Monitored WQ data for 2840 Surface Water sites
- Manually Monitored WQ data for 7950 Groundwater sites

The data is from both current and discontinued monitoring sites.

At present NOW's Water quality archive maintains records relating to all Surface Water and Ground water Quality data collected manually and tested at Laboratories and Surface and Groundwater data collected by loggers and Archived in the Continuously Monitored Archives.

4.1.1 Conductivity Data

This is a measure of the capability of a solution such as water in a stream to pass an electric current. This is an indicator of the concentration of dissolved electrolyte ions in the water. It does not identify the specific ions in the water. However, significant increases in conductivity may be an indicator that polluting discharges have entered water.

4.1.2 Temperature

Water temperature is affected by air temperature, stormwater runoff, groundwater inflows, turbidity, and exposure to sunlight. In considering the health of organisms, it is necessary to consider their maximum temperature and optimum temperature..

4.1.3 Turbidity

Turbidity is a measure of how particles suspended in water affect water clarity. It is an important indicator of suspended sediment and erosion levels. Typically it will increase sharply during and after a rainfall, which causes sediment to be carried into the creek.

4.1.4 pH

pH is a measure of a solution's acidity. In water, small numbers of water molecules (H2O) will break apart or disassociate into hydrogen ions (H+) and hydroxide ions (OH-). Other compounds entering the water may react with these, leaving an imbalance in the numbers of hydrogen and hydroxide ions.

4.1.5 Dissolved Oxygen

Dissolved oxygen is oxygen gas molecules (O2) present in the water. Plants and animals cannot directly use the oxygen that is part of the water molecule (H2O), instead depending on dissolved oxygen for respiration. Water at higher temperatures and altitudes will have less dissolved oxygen. Dissolved oxygen reaches its peak during the day. At night, it decreases as photosynthesis has stopped while oxygen consuming processes such as respiration, oxidation, and respiration continue, until shortly before dawn.

4.1.6 Nitrates & Phosphates

Nitrogen is abundant on earth, making up about 80% of our air as N2 gas. Nitrate enters streams from natural sources like decomposing plants and animal waste as well as human sources like sewage or fertilizer. Nitrate is measured in mg/L. Natural levels of nitrate are usually less than 1 mg/L.

Phosphorus in small quantities is essential for plant growth and metabolic reactions in animals and plants. Sources of phosphate include animal wastes, sewage, detergent, fertilizer, disturbed land, and road salts used in the winter.

4.1.7 Metals

Sodium is a very active metal which does not occur in nature in a free state. High concentrations of sodium will reduce the suitability of water for irrigation or house plant watering use. Potassium concentrations in water are generally very small. Although excessive intakes may have a laxative effect, public health authorities have not established a maximum limit.

Iron in concentrations greater than 0.3 mg/L and manganese in concentrations greater than 0.05 mg/L may cause brown and black stains on laundry, plumbing fixtures and sinks.

Calcium and Magnesium are important contributors to water hardness. When water is heated they break down and precipitate out of solution, forming scale.

4.1.8 Chlorides, Sulphates etc

High concentrations of chloride ions may result in an objectionable salty taste to water and the corrosion of plumbing in the hot water system. Water containing high levels of sulphates, particularly magnesium sulphate (Epsom salts) and sodium sulphate (Glauber's salt) may have a laxative effect on persons unaccustomed to the water.

4.1.9 Total Dissolved Solids

High concentrations of total dissolved solids (TDS) may cause adverse taste effects. Highly mineralized water may also deteriorate domestic plumbing and appliances. It is recommended that waters containing more than 500 mg/L of dissolved solids not be used if other less mineralized supplies are available.

less mineralized supplies are available.

4.2 Key Concepts

There are a number of things that you must know before you can access the data from most programs on Pinneena WQ

4.2.1 Site Location

All monitoring sites operated by NOW are allocated a unique site number.

You must know this number to be able to access the site’s associated data.

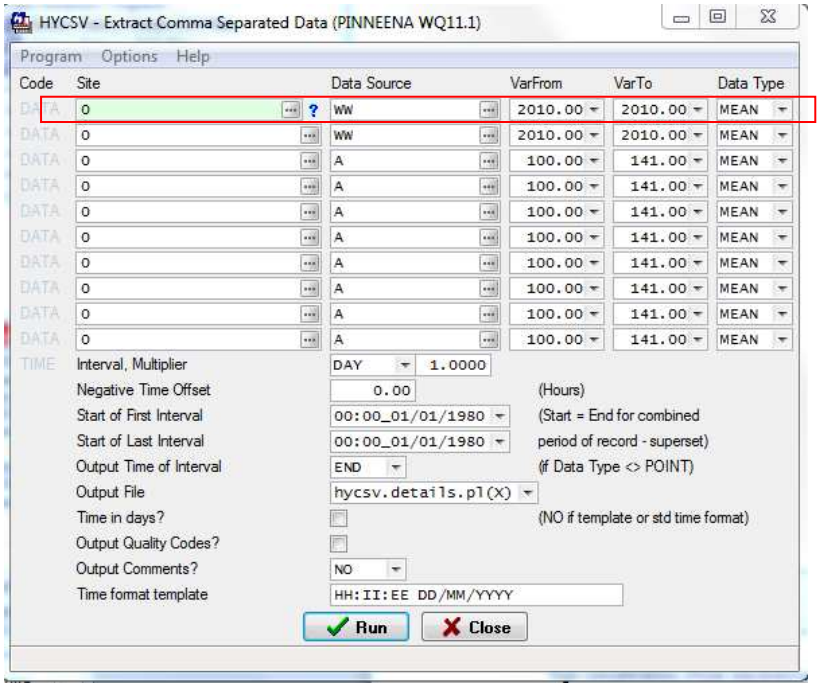

HYCSV - Extract Comma Separated Data (PINNEENA WQ11.1)
Program Options Help
Code Site Data Source VarFrom VarTo Data Type
DATA 0 WW 2010.00 2010.00 MEAN
DATA 0 WW 2010.00 2010.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
TIME Interval, Multiplier DAY 1.0000
Negative Time Offset 0.00 (Hours)
Start of First Interval 00:00_01/01/1980 (Start = End for combined
Start of Last Interval 00:00_01/01/1980 period of record - superset)
Output Time of Interval END (if Data Type <> POINT)
Output File hycsv.details.pl(X)
Time in days? (NO if template or std time format)
Output Quality Codes?
Output Comments? NO
Time format template HH:II:EE DD/MM/YYYY
Run
Close

Figure 6 Sample Pinneena WQ Program Screen – Site Location

There is no information associated with a Groundwater monitoring site number unlike surface site numbers which indicate what river basin they are in. The numbers are allocated somewhat sequentially in order of registration from any part of the state.

All Surface water site numbers follow the same pattern:

210001 or 41210001

and for Groundwater sites: GW075033 – ie the GW identifier and 6 integers

4.2.2 Data Type

Two type of data are provided on this DVD manual measurements, predominantly all Water quality data, and time series measurements which include water level, EC at 25C water temperature , Turbidity, pH , height and flow. The data comes from two separate locations and needs to be accessed differently (A &WW).

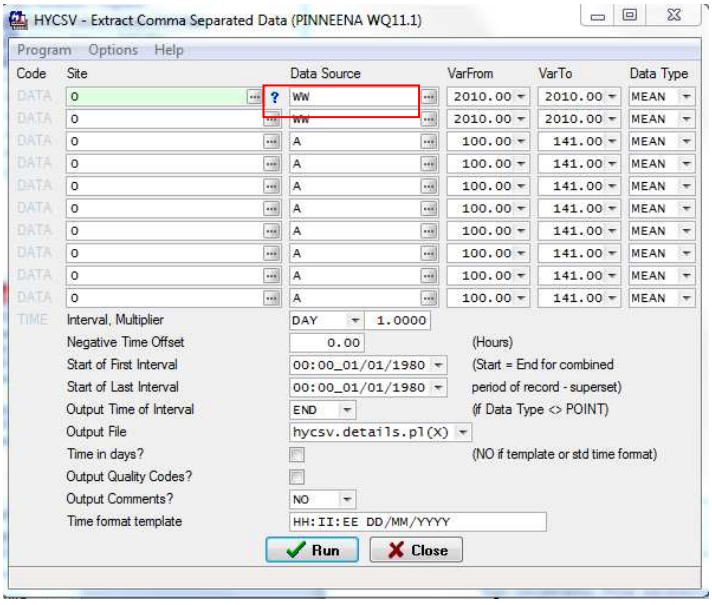

HYCSV - Extract Comma Separated Data (PINNEENA WQ11.1)
Program Options Help
Code Site Data Source VarFrom VarTo Data Type
DATA 0 WW 2010.00 2010.00 MEAN
DATA 0 WW 2010.00 2010.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
DATA 0 A 100.00 141.00 MEAN
TIME Interval, Multiplier DAY 1.0000
Negative Time Offset 0.00 (Hours)
Start of First Interval 00:00_01/01/1980 (Start = End for combined
Start of Last Interval 00:00_01/01/1980 period of record - superset)
Output Time of Interval END (if Data Type <> POINT)
Output File hycsv.details.pl(X)
Time in days? (NO if template or std time format)
Output Quality Codes?
Output Comments? NO
Time format template HH:II:EE DD/MM/YYYY
Run
Close

Figure 7 Sample Pinneena WQ Program Screen - Data Source

Time series data comes from compressed binary files while the manual measurements come from databases. The PINNEENAWQ system will handle accessing and using this data for you but you need to which data it is that you want.

A data source is a means of telling the PINNEENA programs where to get time series data from. It is both a powerful and complex tool but happily the majority of users will only ever use a quite small number of those sources available.

The types of data sources currently supported are:

- Time series data files,
- Time series data in non-standard directories
- Data from various database tables within Hydstra,
- Data from various database tables from other systems, applications and types of databases
- Constant values,

In PINNEENA WQ

4.2.3 Output Destination

PINNEENA GW has the ability to send data to many locations and in many formats.

4.3 Other Useful PINNEENA WQ Concepts

While as much as possible has been done to hide some of the complexities of data discovery and data reporting there are still a number of other concepts that should be understood before attempting to use some of the more complex tools available on PINNEENA GW.

Most of the following concepts apply primarily to Time Series data and those users familiar with PINNEENA CM should have already been introduced to them.

4.3.1 “Continuous” Data

While this is not the most common type of data stored on the PINNEENA GW DVD it is still important. It should be recognised that the name is something of a misnomer in that the data as stored is not continuous rather it is digitally sampled at regular enough intervals to allow an accurate representation of the continuous trace of the data.

With the advancing technology, analogue devices such as a chart recorder, made it possible to continuously record the hydrometric processes as they occurred in nature. However to store this continuous data in computers, it was then necessary to sample it a discrete intervals, ie to digitise the data.

These intervals were chosen so that the data points extracted were able to accurately represent what had occurred in the continuous process. With digital data loggers being used today, this sampling is done automatically. Typically on NSW streams, the recording interval is between 5 - 15 minutes while in groundwater bores the sampling interval is most commonly 60 minutes.

The following plot shows the data displayed using the LINEP (or line and point) option from the HYDSTRA program HYPLOT. Typically the data points are at 15 minute intervals. You may notice some periods where there are no points. This is a feature of HYDSTRA. Where many points fall on a line only the start and end points need to be stored. Any information between these two points can be interpolated. Removing the points compresses the data file size and speeds operation of the programs.

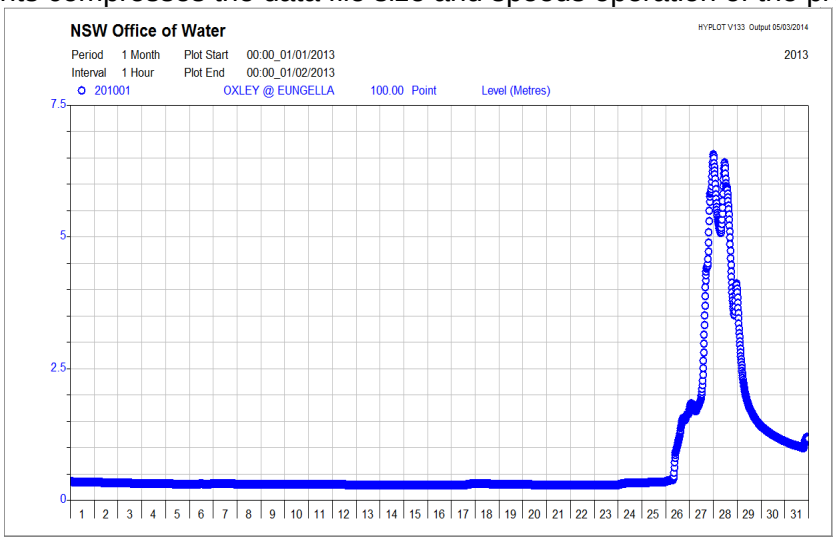


Figure 8, Graph showing the Data Points as stored

4.3.2. Time Series Variable Numbers

Many different types of data types can be collected at one site. To distinguish these different types of data they are allocated unique “Variable Numbers”, and many different “variables” or types of data for the same site are held in a single data file. Common variables available on PINNEENA are:

Stored Data – raw data as collected from the field

10.0	Rainfall	(millimetres mm)
110.0	Water level below measuring point	(metres m)
121.0	Bore water barometric pressure	(kilopascals kpa
2010.0	Water Conductivity	(microsiemens /cm @25C)
2012.0	Uncompensated Conductivity	(microsiemens /cm)
2080.0	Water Temperature	(degrees Celsius)

Other common Variable Numbers which are not stored but are used frequently and are computed on demand by programs within PINNEENA include:

Computed Data – calculated from the raw data

2010.0	Water Conductivity	(microsiemens/cm @25C)
2169.0	Salinity (TDSalts)	(Milligrams per Litre)
2301.0	Calcium as Ca	(Milligrams per Litre)
2351.0	Dissolved Oxygen	(Milligrams per Litre)

Note: It is now standard practice to record uncompensated EC (2012) at a site as well as the temperature (2080). Combination of these two pieces of information in conjunction with knowledge of the ions present in the water produces the standard report variable Electrical Conductivity at 25C (2010). Prior to 2008 it was common practice for this data to be combined in the logging device and just a value for electrical Conductivity @ 25C to be stored.

A full list of variables is available from the Variables Database in the HYDSTRA menus.

4.3.3 Quality Codes (For Time Series Data only)

So that data users can know whether the data they are using has been measured or estimated and whether they are the actual or adjusted readings each data point stored in a site's data file has a quality code associated with it. These codes are to assist modellers with quantifying model uncertainty; resource managers to know how close the recorded value is to a fixed reference, etc.

When collecting the data various forms of a fixed reference are used to verify the veracity of the data.

The fixed reference for water level may be a gauge height from gauge plates installed in the river bank which has been levelled to a recognised benchmark. For a water quality parameter a value may have been measured by a portable instrument, which has been checked against a traceable standard.

As well, manufacturers generally specify accuracy in terms of a percentage of the full scale range of the equipment, rather than specifying a standard error. Their calibration procedures require that all test readings are within the specified tolerances, and instruments are rejected if they do not meet specifications.

Thus, provided that instruments are calibrated regularly according to standard procedures, and that calibration check indicate results are within manufacturers' specification, quality codes 1,3,5,7,9 can be interpreted to indicate that results are within a 95% confidence interval of the true value as far as instrument calibration is concerned.

Quality codes in the range 2,4,6,8,10 are for data that are adjusted from the value read by the sensor. These quality codes can be extracted to digital files along with the values.

The Print Codes associated with quality codes are shown on printed reports, but not on graphical outputs.

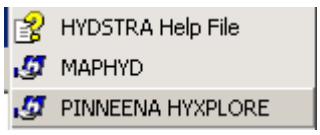
Note: When undertaking data analysis using the HYDSTRA programs data with quality codes greater than 150 are automatically discarded.

Also many of the data conversions involve combining multiple quality codes. For example computed flow data is a combination of height and rating tables, each of which have their own quality codes. The resultant quality code of the computed flow is the worst of the height and ratings.

The full list of Quality codes used by NOW are shown in Appendix C.

5.0 OPERATING PINNEENA

After you have installed PINNEENA GW, four options will be added to the START MENU on your desk top under the PINNEENA GW 10.1 option:



1. **HYDSTRA Help File** online help for operating HYDSTRA programs
2. **MAPHYD,** a spatial, i.e. mapping, interface to the data

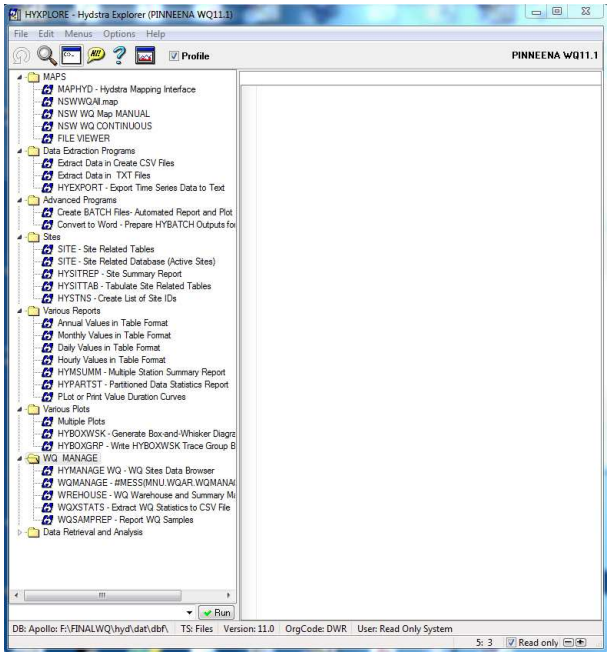
3. **PINNEENA Explorer,** a windows style menu system

A double click by the mouse on any of these options will start a different PINNEENA/HYDSTRA program or help file.

With the use of the 32bit Operating environment some dynamic libraries are loaded into memory at start-up. This may take a short time to load from the DVD but it will decrease the subsequent loading time for most programs.

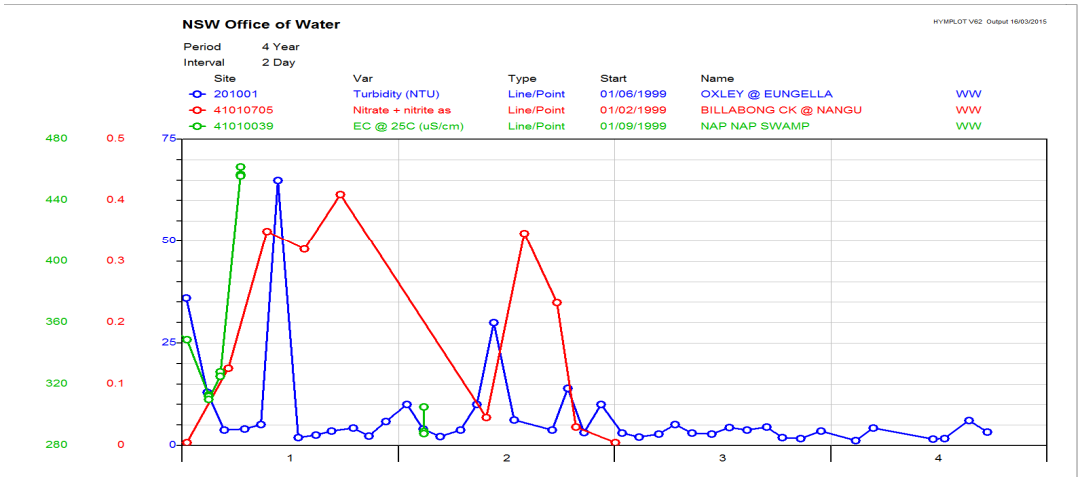
5.1 Using PINNEENA Explorer

When you click on the PINNEENA HYXPLORE option in the start menu a new PINNEENA menu system will be started.


HYXPLORE - Hydstra Explorer (PINNEENA WQ11.1)
File Edit Menus Options Help
Profile
PINNEENA WQ11.1
MAPS
MAPHYD - Hydstra Mapping Interface
NSWWQAll.map
NSW WQ Map MANUAL
NSW WQ CONTINUOUS
FILE VIEWER
Data Extraction Programs
Extract Data in Create CSV Files
Extract Data in TXT Files
HYEXPORT - Export Time Series Data to Text
Advanced Programs
Create BATCH Files- Automated Report and Plot
Convert to Word - Prepare HYBATCH Outputs for
Sites
SITE - Site Related Tables
SITE - Site Related Database (Active Sites)
HYSITREP - Site Summary Report
HYSITTAB - Tabulate Site Related Tables
HYSTNS - Create List of Site IDs
Various Reports
Annual Values in Table Format
Monthly Values in Table Format
Daily Values in Table Format
Hourly Values in Table Format
HYMSUMM - Multiple Station Summary Report
HYPARTST - Partitioned Data Statistics Report
PLot or Print Value Duration Curves
Various Plots
Multiple Plots
HYBOXWSK - Generate Box-and-Whisker Diagra
HYBOXGRP - Write HYBOXWSK Trace Group B
WQ_MANAGE
HYMANAGE WQ - WQ Sites Data Browser
WQMANAGE - #MESS(MNU.WQAR.WQMANA
WREHOUSE - WQ Warehouse and Summary Mi
WQXSTATS - Extract WQ Statistics to CSV File
WQSAMPREP - Report WQ Samples
Data Retrieval and Analysis
Run
DB: Apollo: F:\FINALWQ\hyd\dat\dbf\ TS: Files Version: 11.0 OrgCode: DWR User: Read Only System
5: 3 Read only

PINNEENA HYXPLORE is a menu program for accessing both the HYDSTRA programs and data files on the DVD and displaying the outputs from reporting and plotting programs. It uses the familiar tree paradigm which is used by Windows Explorer, but with some additional features which provide additional flexibility.

It uses a Windows Explorer style interface to find and run the HYDSTRA/PINNEENA programs and to display outputs. The menus options are controlled by an XML file and while they have been configured for the PINNEENA users it is possible for more advanced users to modify this file in their \TEMP directory to change the appearance of the menus and to add external programs, data files, Perl procedures, etc to the menus. (If you contemplate making any changes a copy of the original menus will always be available from the DVD.)


NSW Office of Water
Period 4 Year
Interval 2 Day
Site Var Type Start Name
201001 Turbidity (NTU) Line/Point 01/06/1999 OXLEY @ EUNGELLA WW
41010705 Nitrate + nitrite as Line/Point 01/02/1999 BILLABONG CK @ NANGU WW
41010039 EC @ 25C (uS/cm) Line/Point 01/09/1999 NAP NAP SWAMP WW
480 440 400 360 320 280
0.5 0.4 0.3 0.2 0.1 0
75 50 25 0
1 2 3 4

On the left hand side of HYXPLORE the programs can be accessed in the menu tree by clicking on the folder icon and displaying the options beneath. The Folders are opened by clicking in the + box to the left of the description, or by double clicking on the description itself.

Folders are closed by double clicking again, or by clicking on the - box to the left of the description. Folders are of various types, and the behaviour of the folder when opened depends on the folder type. Each folder option is displayed in the tree using a visual icon to indicate its type.

A menu item preceded by a plus sign (+) implies that this item has further sub-menus to follow.

At the lowest level are the programs themselves. Clicking on a program icon will start the program parameter screen (where you control the programs operation). Output from programs appears in the right hand side window of PINNEENA Explore.

A range of shortcuts are also available on the Explorer screen as shown below.

	Rerun (Again)	Runs the currently selected menu item, with the same parameters as used during the previous run. The Menus | Rerun menu option and the <F8> key does the same thing.
	Search	Displays a dialogue box to search for a HYDSTRA menu item. You may search for any part of a menu item.
	DOS	Creates a DOS box in which you can run commands. The File | DOS shell menu option and the <F9> key does it also.
	Login	Lets you login and change user IDs, not required for PINNEENA.
	Help	Starts up the HYDSTRA help file, at the topic of the currently highlighted program.
	Hide/ Unhide	This hides/unhide the menus in the left hand pane to give your outputs greater viewing area.

There are also a range of shortcut keys which will assist you in operating HYDSTRA programs. They include:

[F1] is the help key as discussed above.

[F8] is the rerun key;

Allows you to re-run the last job. All the parameters from the last time you ran the program are restored and can be used again and/or edited.

[F9] is the Shell to DOS key;

at the DOS prompt - exit[ENTER] or closing the window will return you to the HYDSTRA menu.

[ALT] [F4] will exit you completely from the HYXPLORE.

[ESC] will take you from the parameter or menus screen to the next menu above.

At the top line of the screen here is located a series of drop down menus, access to which may also be gained by pressing the [ALT] key and the underlined or highlighted character. These options also have shortcut keys so they can be accessed directly. Some of the more common options have been described above including [F1] for help.

6.0 MAP INTERFACE TO DATA

The MAPHYD program provides the easiest way to access to the data and reports on the DVD. All data can be accessed simply by using the mouse.

MAPHYD can be loaded from the PINNEENA Explorer, PINNEENA Menu or alternatively the user can choose to start MAPHYD from the Windows Start Menu entry,

The default map (NSW River Basins) is loaded automatically when the program is started from PINNEENA Explorer. Using the MAPHYD icon from the PINNEENA Start Menu starts the program without a map loaded. The maps then available on PINNEENA are:

1. NSW Macro Plans
2. NSW Local Government Areas
3. NSW All Bores, Monitoring Bores, Manually Monitored Bores
4. NSW Rivers

To change to or select another map use the File menu option, choosing Open … and then selecting the map of your choice. This map will load for the current session only. The default map cannot be changed.

On the maps the user can move around the state, panning or zooming into areas of interest.

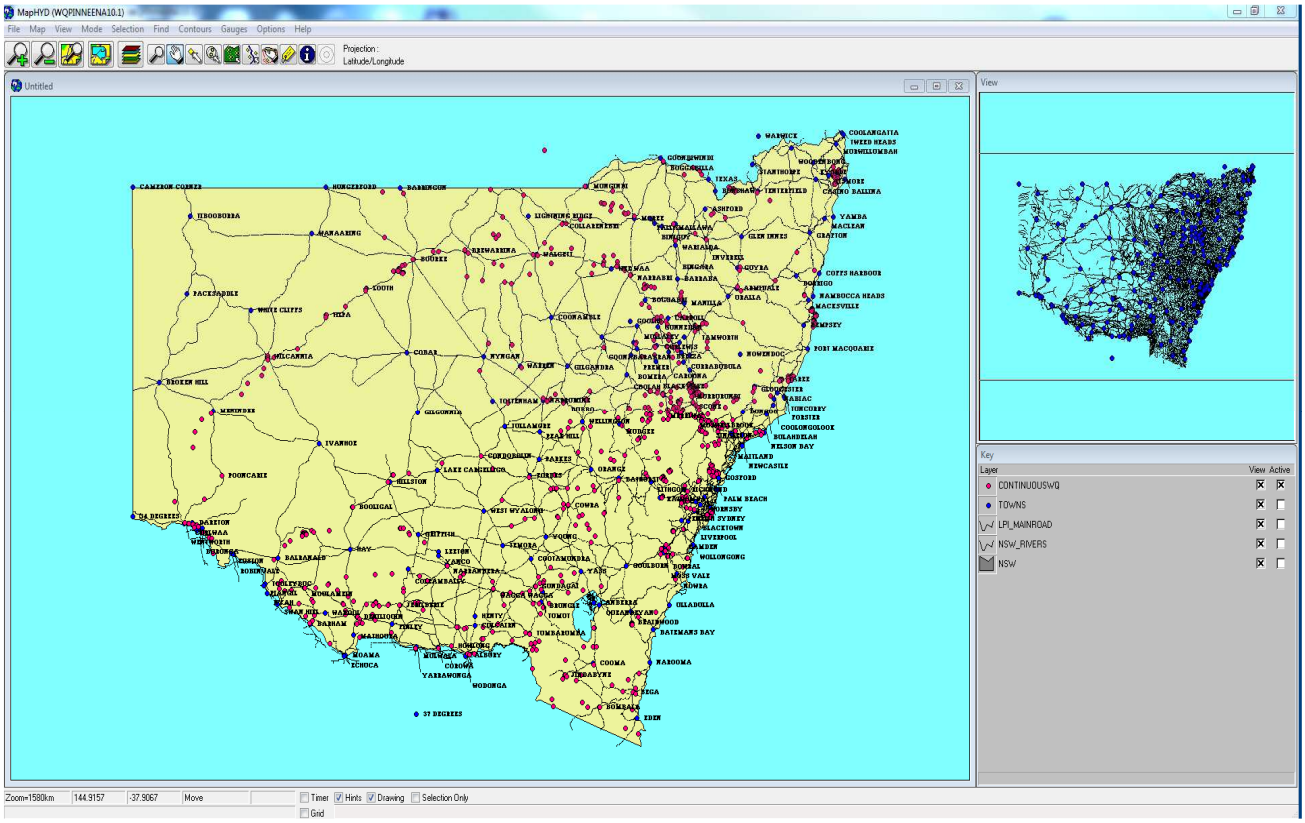


Figure 9 – View of Various layers in MAPS

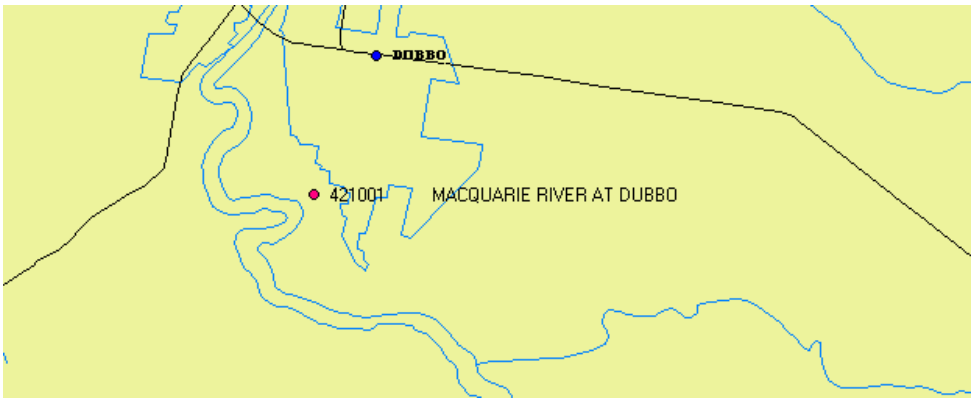
6.1 Using the map to view data

Zoom into the area of interest using either the Zoom Icon and selecting an area in the NSW Base Map main window or selecting an area in the smaller View window.

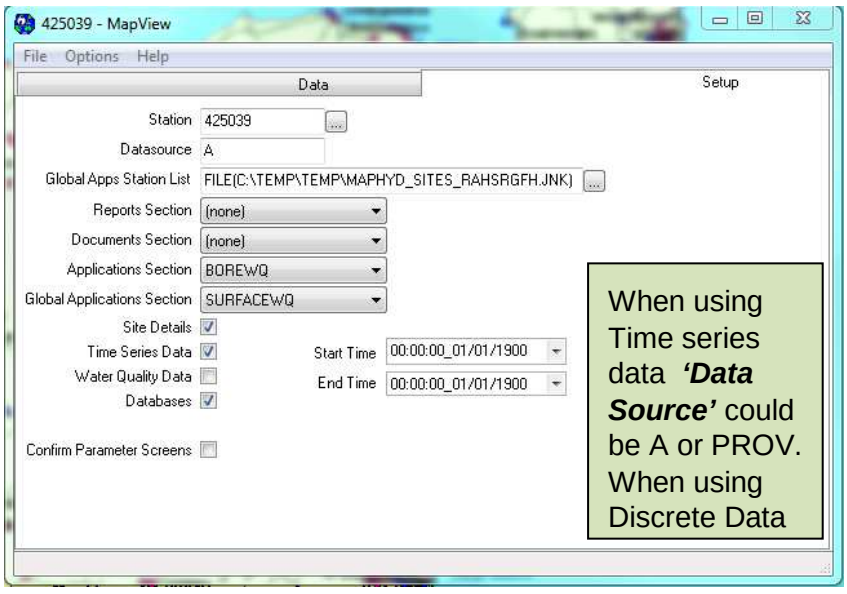
(These actions are explained in more detail in the following section.)

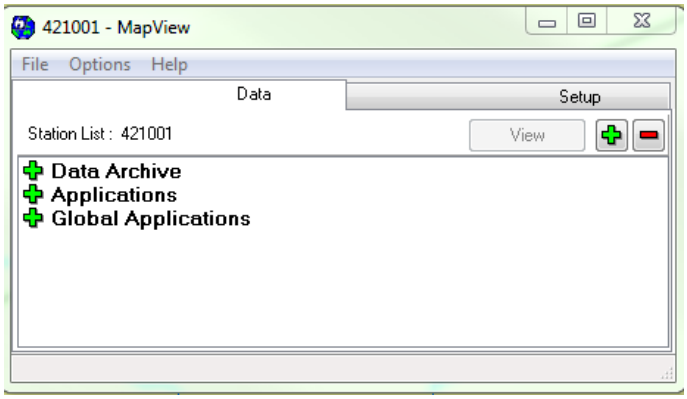
If a Site Layer is viewable and active (ie both tick boxes are selected in the Key Window),

and the right mouse button is clicked when on a site (blue triangle) then a pop-up site descriptor appears on the screen with the site number and name.



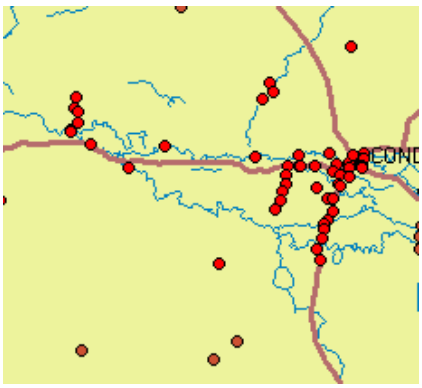
By right clicking on the this popup a program called Map View is started. This program, allows site-specific interactive of data from this site.





6.2 Using the Map to select groups of sites

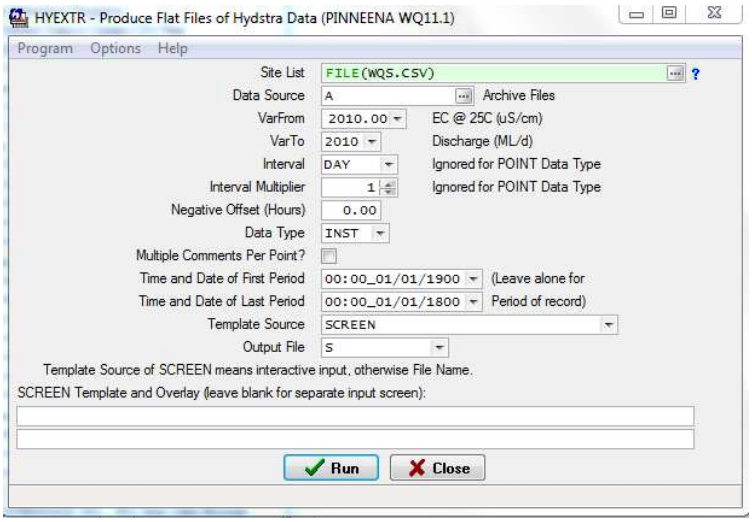
As an example NSW GW Map ALL is used in the example. From ‘Mode’ menu select ‘Radius Select’ or activate the icon . Move the curser to the centre of radius and expand the radius to the required extent. The selected area bores will change to red in colour while other bores remain (blue) in their original colour.



Goto ‘selection’ and click the Save selection to File/Table. This will be automatically saved under c:\temp directory. For example name the file as ‘sample.txt’. The sample.txt file will look like pasted below

```
GW021236
GW021237
GW021238
41210066
GW021239
412013
GW059420
412014
GW059353
412119
41210171
41210070
412006
41210072
412034
41209001
GW026645
412059
GW053669
GW021228
GW021165
412188
412113
GW021300
412046
```

This could be used as a file list for any program calls for ‘File List’



Data Extraction using HYEXTR

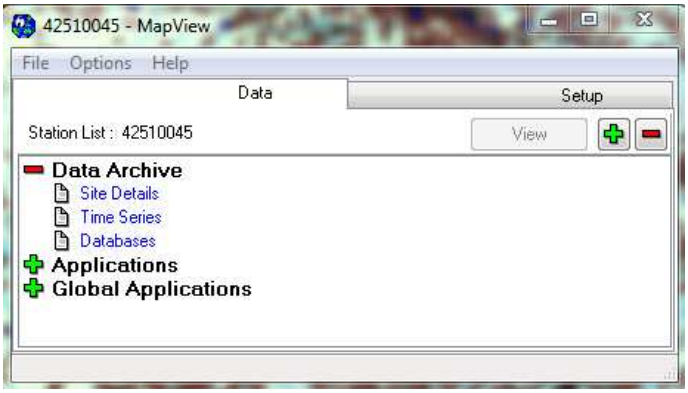
```
GW021236 2010.00 1966/03/01 1200   38900.000 120
GW021236 2010.00 1966/03/01 1200   25150.000 120
GW021237 2010.00 1966/03/15 1200   56500.000 120
GW021237 2010.00 1966/03/16 1200   26700.000 120
GW021237 2010.00 1966/03/17 1200   38800.000 120
GW021237 2010.00 1966/03/18 1200   39300.000 120
GW021237 2010.00 1966/03/20 1200   26000.000 120
GW021237 2010.00 1966/03/22 1200   23500.000 120
GW021238 2010.00 1966/04/14 1200    2760.000 120
GW021238 2010.00 1966/04/19 1200   27500.000 120
GW021238 2010.00 1966/04/20 1200   19200.000 120
GW021238 2010.00 1966/04/22 1200   17900.000 120
GW021238 2010.00 1966/07/11 1200    4720.000 120
GW021239 2010.00 1966/04/20 1200     705.000 120
GW021239 2010.00 1966/04/20 1200     470.000 120
GW059420 2010.00 1983/06/01 1200   13950.000 120
412014   2010.00 1970/03/23 1200     500.000 120
412014   2010.00 1970/05/18 1200     330.000 120
412014   2010.00 1970/07/15 1200     680.000 120
412014   2010.00 1970/10/15 1200     308.000 120
412014   2010.00 1971/04/07 1200     340.000 120
412014   2010.00 1971/06/28 1200     520.000 120
412014   2010.00 1971/09/13 1200     510.000 120
412014   2010.00 1971/10/25 1200     415.000 120
412014   2010.00 1972/04/28 1200     290.000 120
412014   2010.00 1972/07/05 1200     450.000 120
412014   2010.00 1972/08/30 1200     394.000 120
412014   2010.00 1972/10/27 1200     313.000 120
412014   2010.00 1972/12/04 1200     335.000 120
412014   2010.00 1973/03/13 1200     514.000 120
412014   2010.00 1973/06/08 1200     450.000 120
```

Multiple outputs will be extracted as shown above.

6.3 Data Archive

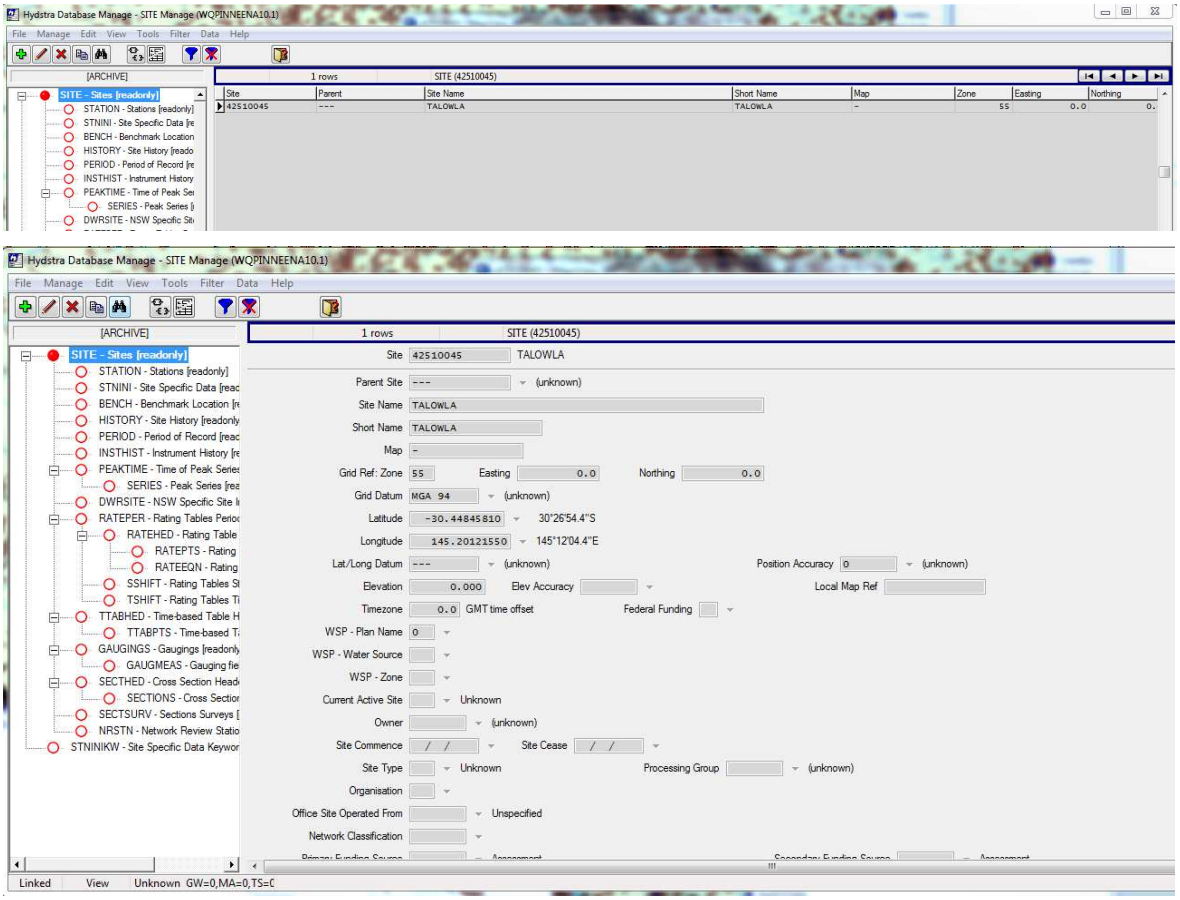
Data Archive will list the types of data available for the site.

A mouse click on the green button or a double click on the menu items



6.3.1 Site Details

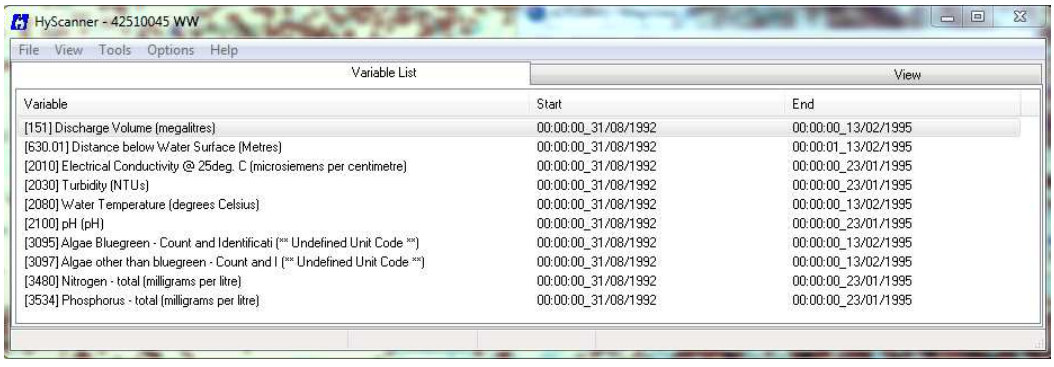
Double clicking on Site Details will display site details from mthe site database. The site details view may be changed from spreadsheet/table view a to a form view using the Form View button.


Hydstra Database Manage - SITE Manage (WQPINNEENA10.1)
File Manage Edit View Tools Filter Data Help
[ARCHIVE]
SITE - Sites [readonly]
STATION - Stations [readonly]
STNINI - Site Specific Data [re
BENCH - Benchmark Location
HISTORY - Site History [readonly]
PERIOD - Period of Record [re
INSTHIST - Instrument History
PEAKTIME - Time of Peak Ser
SERIES - Peak Series [
DWRSITE - NSW Specific Site
RATEPER - Rating Tables Period
RATEHED - Rating Table
RATEPTS - Rating
RATEEQN - Rating
SSHIFT - Rating Tables Sh
TSHIFT - Rating Tables Ti
TTABHED - Time-based Table H
TTABPTS - Time-based Ta
GAUGINGS - Gaugings [readonly]
GAUGMEAS - Gauging file
SECTHED - Cross Section Head
SECTIONS - Cross Section
SECTSURV - Sections Surveys
NRSTN - Network Review Station
STNINIKW - Site Specific Data Keywor
1 rows
SITE (42510045)
Site 42510045 TALOWLA
Parent Site --- (unknown)
Site Name TALOWLA
Short Name TALOWLA
Map -
Grid Ref: Zone 55 Easting 0.0 Northing 0.0
Grid Datum MGA 94 (unknown)
Latitude -30.44845810 30°26'54.4"S
Longitude 145.20121550 145°12'04.4"E
Lat/Long Datum --- (unknown) Position Accuracy 0 (unknown)
Elevation 0.000 Elev Accuracy Local Map Ref
Timezone 0.0 GMT time offset Federal Funding
WSP - Plan Name 0
WSP - Water Source
WSP - Zone
Current Active Site Unknown
Owner (unknown)
Site Commence / / Site Cease / /
Site Type Unknown Processing Group (unknown)
Organisation
Office Site Operated From Unspecified
Network Classification
Linked View Unknown GW=0,MA=0,TS=0

6.3.2 Time Series

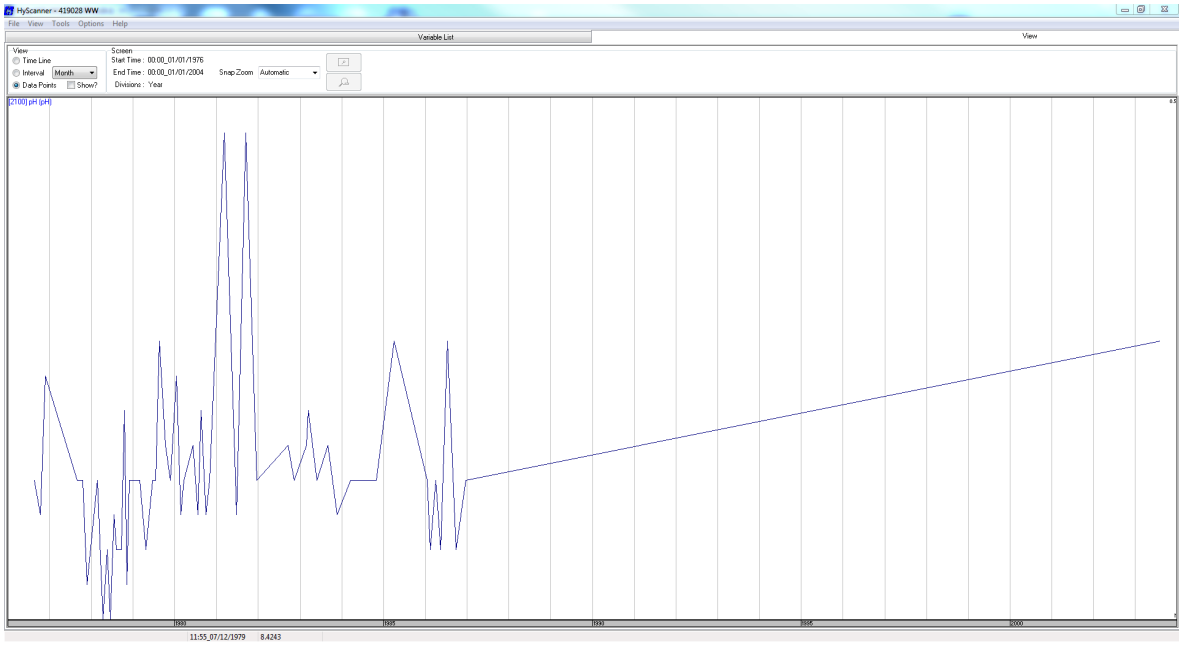
Double clicking on Time Series will show a list of data stored by variable for the nominated site. This uses the program HYSCANNR The program is also available from the Data Management option.

This parameter screen gives the user a list of the data available for the nominated site. One or more variables may be selected for viewing by holding the 'Control Key' down when clicking the appropriate data line with the mouse.

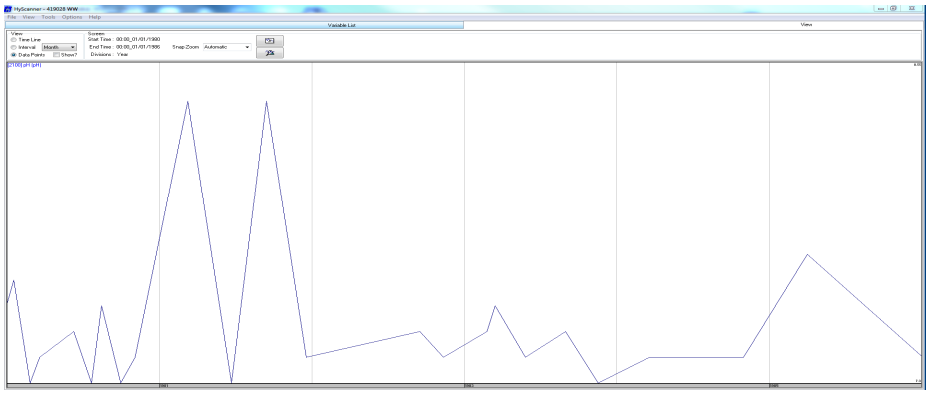

HyScanner - 42510045 WW
File View Tools Options Help
Variable List
View
Variable
Start
End
[151] Discharge Volume (megalitres) 00:00:00_31/08/1992 00:00:00_13/02/1995
[630.01] Distance below Water Surface (Metres) 00:00:00_31/08/1992 00:00:01_13/02/1995
[2010] Electrical Conductivity @ 25deg. C (microsiemens per centimetre) 00:00:00_31/08/1992 00:00:00_23/01/1995
[2030] Turbidity (NTUs) 00:00:00_31/08/1992 00:00:00_23/01/1995
[2080] Water Temperature (degrees Celsius) 00:00:00_31/08/1992 00:00:00_13/02/1995
[2100] pH (pH) 00:00:00_31/08/1992 00:00:00_23/01/1995
[3095] Algae Bluegreen - Count and Identificati (** Undefined Unit Code **) 00:00:00_31/08/1992 00:00:00_13/02/1995
[3097] Algae other than bluegreen - Count and I (** Undefined Unit Code **) 00:00:00_31/08/1992 00:00:00_13/02/1995
[3480] Nitrogen - total (milligrams per litre) 00:00:00_31/08/1992 00:00:00_23/01/1995
[3534] Phosphorus - total (milligrams per litre) 00:00:00_31/08/1992 00:00:00_23/01/1995

The following screen shows the 'time line' of the data. The period of record shows the start and end of the data, but does not indicate whether the data is continuous or not. The time line will show if there are any gaps in the data.

By selecting Data Points or Show, the data itself can be displayed.



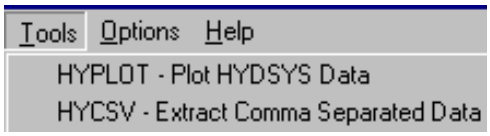
Selection of Interval will show the data at the default interval. The display interval can be changed by clicking on the small down arrow to the right of the interval.



The user may also zoom into the period of interest by moving the cursor to the start, pressing left mouse button, pulling along the horizontal line up to the end point and then releasing it.

6.3.3 Outputting Data from MapView

A right mouse click on the trace will display a list of HYDSTRA programs that are available for use for that individual trace.



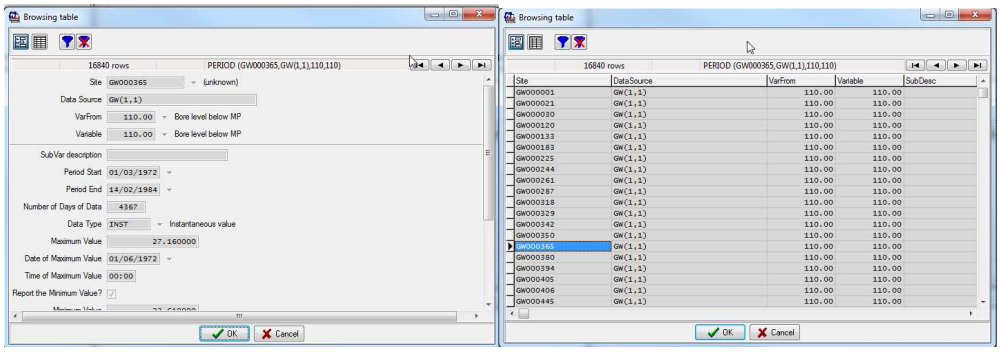
If you select one of these, HYDSTRA will automatically complete the parameter screen for you using the start and end points of the window for the period. You can also use the Tools menu to select one of two programs that will operate on all traces you have selected. For example in the previous page we were

displaying stream height and electrical conductivity. Using the HYPLOT option from the Tools menu we would get the parameter screen for a plot with these two traces.

6.3.4 Databases

Returning to the MapView interface, double clicking on Database will display the HyDBView screen. Here you can select the database you wish to view. First choose a path under System and the click Hit Counts. HYDSTRA will check all databases in that system and display those with data for the nominated site

By double clicking with the mouse or clicking the Browse button, select the database you wish to view. Then using the mouse and the four arrow buttons, you can browse your way through the database.

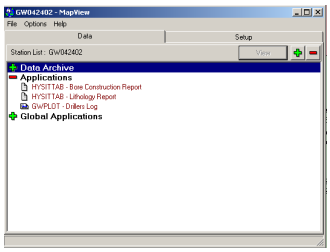


The two left-hand buttons will toggle from a form view showing one record per screen to a table view listing the records in tabular form as shown on the next page.

When you have finished, click the OK or Cancel button to return to the database selection screen.

6.3.5 Reports

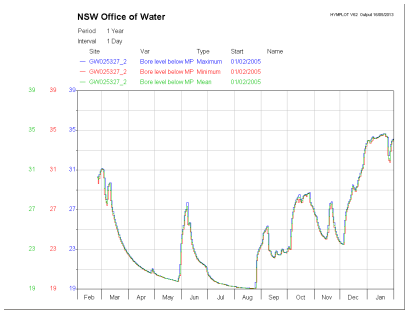
Returning to Map View, under the 'Data' tab you will find a menu option for 'Reports'.



This menu provides access to a range of pre-computed reports which can be viewed by clicking on the report title. The report will be displayed to the screen with the standard HYDSTRA screen options, ie to modify, to print the report or send to the clipboard.

All these reports have been generated using HYDSTRA programs and stored on the DVD to save you having to run the programs yourself. They are a quick way to see what data is available at a site before examining the data in more detail.

Clicking on a report (e.g. the HYMXMEAN plot) will open that report in the HYXPLORE window.



6.3.6 Mapping Interface Components

The HYDSTRA help system contains a comprehensive explanation of the components of MAPHYD. The following is a quick review of the more useful features.

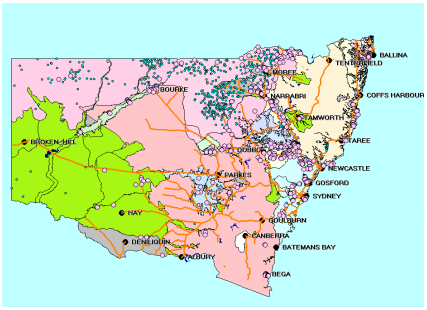
Menu Bar

At the top of the screen is the menu bar, which provides access to all the functions of the mapping package.

6.3.7 Shortcut Buttons

The shortcut buttons allow quick access to various menu actions. The buttons are explained in more detail in the following sections.

6.3.7.1 Map Window

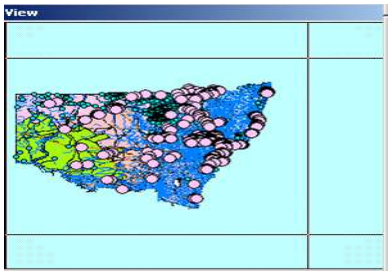


The large window on the left is the map window. It will display the map name in the top left hand corner.

This is the active map viewing area where all connections to the data are made.

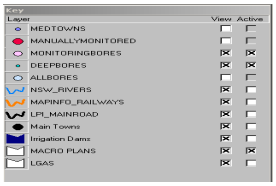
6.3.7.2 View Window

The small window on the right is the View Window. It will always show the whole area of the map



Aa rectangle indicating the current zoom position in the Map Window will appear when you have zoomed in on the main window to indicate your position.The mouse cursor is always in Zoom mode in this window. The View Window may be used to move quickly around the map.

6.3.7.3 Key Box



The Key Box displays a symbol and some descriptive text for each map layer.

Alongside these are check boxes for each layer. These are a shortcut to the layer's View and Active attributes.

A right mouse button click on the key text presents a pop-up menu that allows changes to be made to a layer's display options. This will be discussed in more detail later.

6.4 Pan and Zoom

6.4.1 Movement Buttons

The first 2 buttons with the magnifying glass icons are the zoom buttons. Pressing one of these will move the viewer in the given direction The current zoom step is 25%, which will move the map by 25% of its width in the main Map Window.

The hand button will allow the user to grab the map and move it in any direction..

Zoom Right Out - Returns the main map window to the original zoom that the map opened in. Ctrl-O is a shortcut.

Last View - Returns the main map window to its previous zoom. Alt-Backspace is a shortcut.

Layer Control - A shortcut to the map's Layer Control dialog box. Ctrl-L is a shortcut.

Zoom Right Out - Returns the main map window to the original zoom that the map opened in. Ctrl-O is a shortcut.

Last View - Returns the main map window to its previous zoom. Alt-BackSpace is a shortcut.

Layer Control - A shortcut to the map's Layer Control dialog box. Ctrl-L is a shortcut.

6.5 Mouse Functions

6.5.1 Mode Box

The Mode Box contains a group of ten buttons that select the type of action a mouse click will perform in the Map Window. The modes in order from left to right are:

Zoom Click in the Map Window. Drag the mouse until the rectangle contains the parts of the map you want to see. Release the button, and the Map Window is zoomed in on the required portion. To zoom in to a region, make sure that the region's layer is active (in the Key box) and simply click on that region (no dragging). The same applies to line objects.

Move Hand Explained above

Point Select Selects point objects, e.g. sites. Refer to the section on Selection Mode in the Selection menu details.

Radius Select selects points in a circle.

Region Select selects points inside a region.

Line Select selects points within a given distance of a line.

Freehand Region Select allows a region to be drawn on the map and points inside this region will be selected.

Label The "top" object is labelled, i.e. the object in the uppermost layer under the mouse click.

Info The "top" object is found and its layer and label are displayed in a dialog box.

Move Point would allow point objects to be moved on a non DVD system

6.5.2 Status Line Controls

At the bottom of the map there are several controls:

Hints If this box is checked then all buttons, edit boxes and other components will display little pop-up hints when the mouse cursor moves over them. This is very helpful when you are learning to use the program.

Drawing If ticked, the map drawing is displayed as it goes (i.e. builds the picture on the screen) un-ticked it will build the picture off-screen and just present the finished map.

Zoom Indicator In the lower left corner is the zoom indicator. It shows the approximate distance (in kilometres) between the left and right edges of the map in the map window.

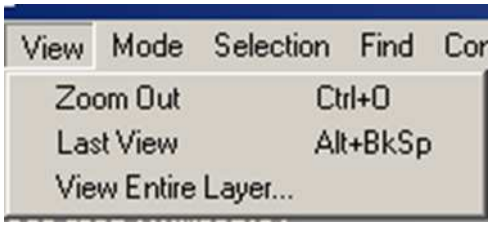
Position Indicator Whenever the cursor is in the map window, its approximate position is displayed in the middle of the bottom line.

Mode Indicator The current mode of the mouse's left button is displayed at the bottom of the screen.

Selection Indicator Next to the mode indicator is another window which displays the number of currently selected points.

6.5.3 View Menu

The view Menu provides options for moving about the main window.



Zoom Out This command zooms out to the extents of the View Window. <Ctrl/O> is a shortcut.

Last View Returns the main map window to its previous zoom state. Alt-Back Space is a shortcut.

View Entire Layer This option presents a list of layers. Select the layer you wish to zoom to and the main map window will zoom in or out to contain the entire desired layer.

NOTE: this has no effect on that layer's maximum zoom - so you may find that the map zooms out beyond the layer's maximum zoom.

6.5.4 Find Menu

The find menu has several options to assist in locating features on the map.

Go to Lat/Long...Allows movement to a known location and predetermined zoom distance. The initial Lat/Long will be the centre of the current map window. The latitude and longitude are displayed in a dialog for manual refinement. The dialog has two "pages" - one for decimal latitude and longitude, and a page for the full degrees / minutes / seconds / hemisphere representation. Either page may be used with equivalent results. When the OK button is clicked, the main map window will be zoomed to centre on the requested location, and have the requested zoom distance across the map.

Point Search... Finds a point object by specifying a portion of text. The text could be the whole or part of a gauging site name or number. Each object's label is scanned for this text. The search is case insensitive. If multiple objects are found, a list is presented. Note that this list also includes the layer name of the object.

Zoom to Line... Presents a list of line objects in all layers. Double click on the line's identifier and the main map window will zoom in to contain the selected line.

Zoom to Region...Presents a list of region objects in all layers. Double click on the region's identifier and the main map window will zoom in to contain the selected region.

6.5.5 Mode Menu

The Mode menu indicates the selection method to be used during the selection.

Layers may be temporarily selected or de-selected for any session, just toggle the appropriate selected box with a mouse click

Any selection operation adds to the current selection. To restart the selection, chose Selection|Clear Selection first. If the Shift key is held during one of the mouse-based selection operations (Select, Radius Select or Region Select) then the selected status of all the newly selected points will be reversed.

6.5.6 Selection

These dropdown menus are used to select individual and groups of sites. Selections can only be made on those layers marked Active in the Key box eg. current and discontinued sites.

Clear Selection Clears the current selection. All selected point objects are de-selected. Ctrl-C is a shortcut.

Browse Selection... Displays a list of all currently selected point objects.

Zoom to Selection zooms the main map window to display the entire selection.

Load Selection... Loads a list file, e.g. one created by Save Selection..., and selects the objects that have an identifier contained in the list.

The full path and file name needs to be specified, including the file extension. If the extension is .DBF, the file is assumed to be a dBase file. Otherwise the file will be read as an ASCII text file with the one identifier per line, and the site identifier as the first "word" on that line. An active layer is required. Click on this text box to display a list of selectable layers. The layer name displayed here will be the target of the selection. In the case of a database file, a list of fields is presented. Double click on the name of the field that will contain the object identifiers.

Save Selection... Saves the current selection as a list of the selected objects' identifiers. A dialog box prompts for the name and type of file to produce. Use the File Type pick list to choose the type of file to save. If the file type is a database, then a dBase database file is produced. It has one 8-character field called SITE. Otherwise, the list will be written to an ASCII text file.

Select from Site List... A list of site can be supplied. Each site in the list is searched for in the active site layers.

7.0 OBTAINING HELP

Help for PINNEENA users is available in a number of ways.

1. This document is available as a Adobe Acrobat file for printing from the root directory of the DVD as PINNEENA Mannual.PDF (Is available in http://waterinfo.nsw.gov.au/pinneena/pinneena_gw_10.1_user_guide.pdf)
2. There is an on-line help system for the HYDSTRA programs which is loaded as a separate Start menu item as part of the installation
3. There is on-line help available from within PINNEENA's HYDSTRA menu by pressing <F1>, and
4. There are a range of on-line help features available in each HYDSTRA parameter screen.

7.1 PINNEENA Help

The PINNEENA help (this document) is accessible in a number of ways:

- It is available as a Adobe Acrobat PDF file for viewing and printing in the root directory of the DVD.
- It is available as a help file in the root directory of the DVD.

To read this file you will need a copy of Acrobat reader. Any version will be able to read the file but the latest version can be found at www.adobe.com or at a number of software and shareware related sites. The download is free.

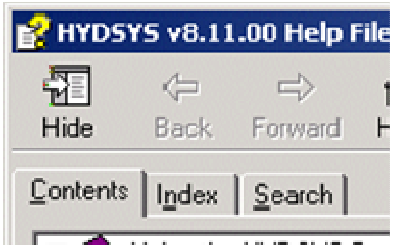
7.2 HYDSTRA Help

A windows help file is available to all PINNEENA users explaining how to use the various HYDSTRA programs.

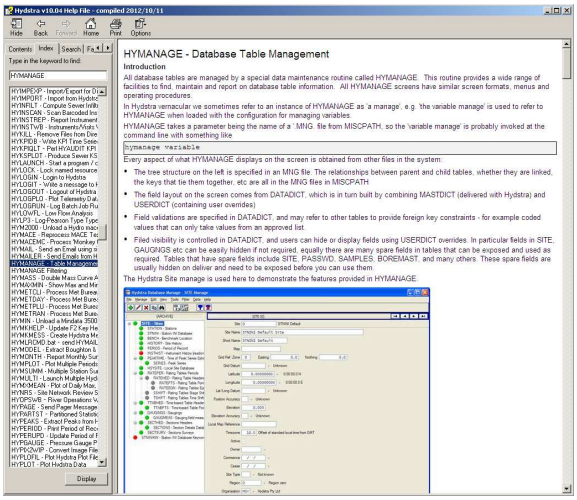
This can be obtained before starting the program by selecting the Hydstra Help File option in the Windows Start menu the on-line HYDSTRA help manual will be made available.

Also, using the <F1> key or the blue question mark key icon on the HYXPLORE menu bar while a menu item is highlighted, or using the Help function from within a program screen will take you to the help screen for that program or option.

The on-line help system will open with the relevant section opened for viewing:

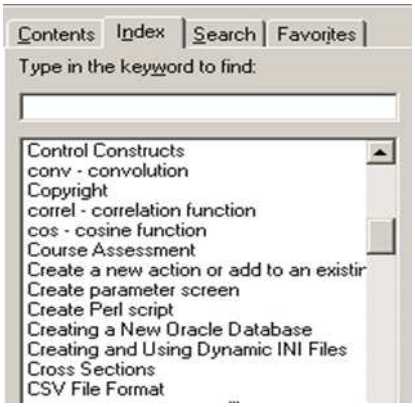


If not already at the desired location, clicking on the Contents tab will show the full list of chapter headings.



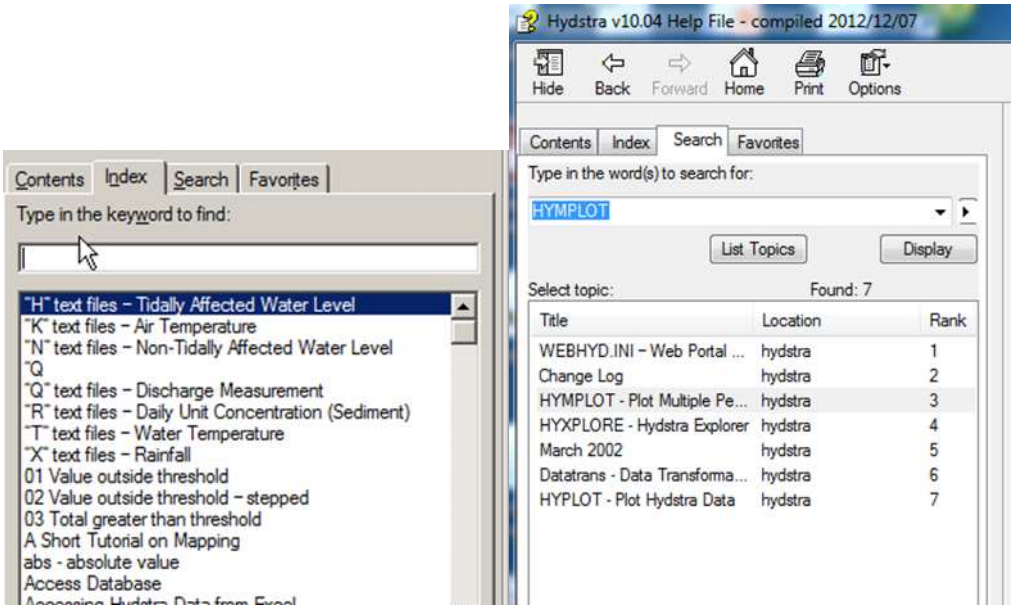
This list may be expanded by either double clicking a book icon or clicking on the '+' sign when a book icon has been selected. Clicking on any of the pages icons will display the information about the topic in the right-hand box.

7.2.1 Other Help Features - Index



Selecting the Index Tab will show a list of all Key words that have been indexed in the help file. Clicking on a topic in the Left hand pane will take you to that key word/phrase in the help file.

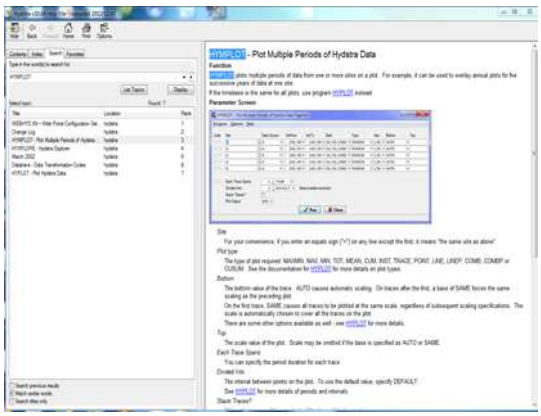
7.2.2 Other Help Features - Search



If you click on the Search tab, a window will appear in which you may enter the word(s) you are searching.

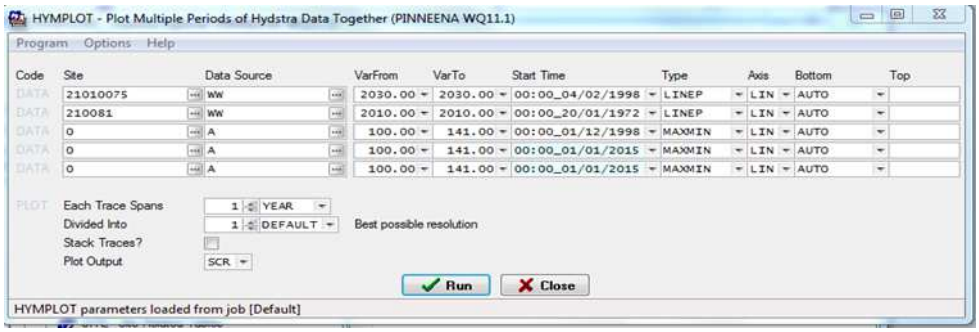
Clicking on the List Topics button will display the list of topics where that word(s) appear.

As well as typing in the words, the small right arrow next to the box lets you select a Boolean operator to interpose between words. Enter one or more words, with an operator if necessary and you will be shown every document in which the combination appears. For example, type the words **flow NEAR duration**:



Press <List Topics> to see the relevant documents, then select the desired entry. The document page is displayed with all its relevant information.

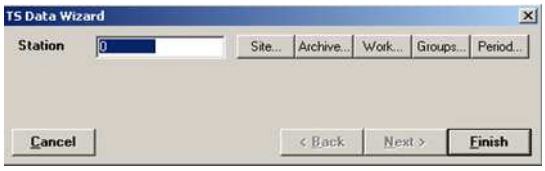
7.3 In Program Help


HYMPLOT - Plot Multiple Periods of Hydstra Data Together (PINNEENA WQ11.1)
Program Options Help
Code Site Data Source VarFrom VarTo Start Time Type Axis Bottom Top
DATA 21010075 WW 2030.00 2030.00 00:00_04/02/1998 LINEP LIN AUTO
DATA 210081 WW 2010.00 2010.00 00:00_20/01/1972 LINEP LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/12/1998 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
PLOT Each Trace Spans 1 YEAR
Divided Into 1 DEFAULT Best possible resolution
Stack Traces?
Plot Output SCR
Run
Close
HYMPLOT parameters loaded from job [Default]

When a HYDSTRA program has been selected and loaded, HYDSTRA will provide extensive help facilities. This is available by pressing the Down arrow or ellipsis at the right hand side of each of the data entry boxes. This produces a series of dialog boxes that show available options.

Examples of these help options are shown below.

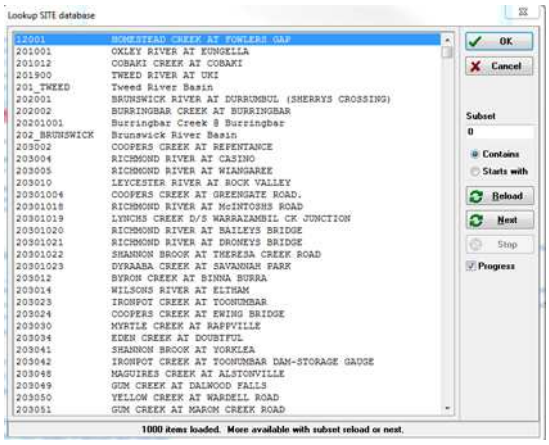
7.3.1 Data Wizard



The TS Data Wizard will load a screen that allows you to select a site from the SITE table, the time series archive or the PERIOD table. Work areas and groups are not active in Pinneena.

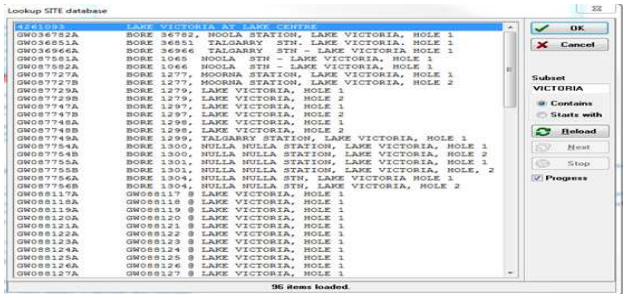
7.3.2 Selecting Site from the Site Table

Clicking the Site button brings up a dialog box with all sites listed in numerical order. You can use the mouse and scroll bar or the <Page Up>, <Page Down> and arrow keys to move up and down this list to select a site.



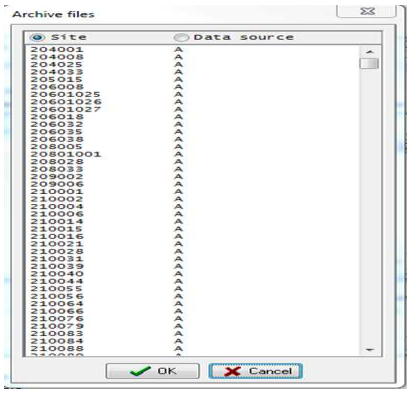
To search for a site or stream enter part or all of the site name in the Subset box then click the left mouse button on the Any text button and click on the Reload button. In the following example we have entered “VICTORIA” as part of a site name

The program will then check the SITE database for occurrences of the word VICTORIA and list the site details as they are found. You can halt this listing, when the site you seek is listed, by clicking on the Stop button.



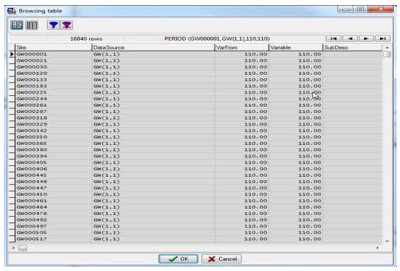
You can make your selection by moving the cursor to the required site and clicking on the OK button.

7.3.3 Selecting a Site from the Archive



The program provides a File List dialogue box in which you can scroll though a list of sites for which data is held in the archive. You may also enter the site identifier, ie the site number, in the File Name box. Note that entering the site name will not work. When selecting files, you must select the data file (eg GW025333_04.A) rather than the index file (GW025833_04.AX).

7.3.4 Selecting a Site from the Period Table



The program will provide a view of the Period table which shows what data has been collected at each site, from which you may select a site, variable and period to view.

7.4 Filling in the Other Data

At each step the Wizard gathers the data necessary to fill out the parameter screen of the calling program. At any time all this information can be transferred across to the

program's parameter screen for you by clicking on the Finish button.

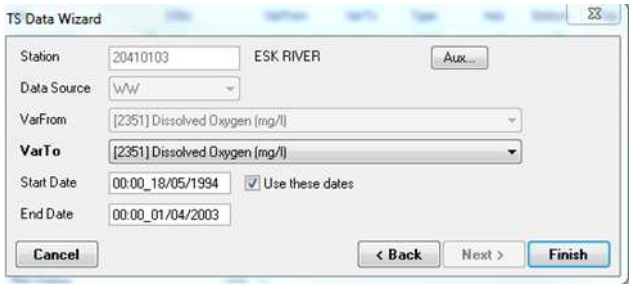
To gather this data after you have selected your site you click on the Next button. The program will respond with the suffixes for any data files for that site (in PINNEENA there will only be one suffix A) - click on the Next button to move on.

The Wizard will then check the data file and list all of the variables for which data is held.

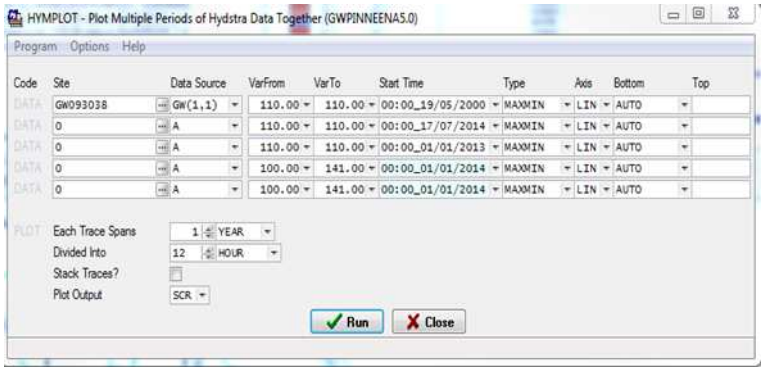
Select the required variable and click the Next button.

The program will then list (in a drop down list) all possible data conversions for the selected variable. The most common variable conversion is automatically selected for you but you can select any of the valid conversions from the list.

Clicking the Next button will select the most appropriate plot type to display your data or allow you to select the plot type you desire. The period of record for the selected data will also be displayed.



Clicking on the Finish button will return you to the calling program with the parameter screen completed.

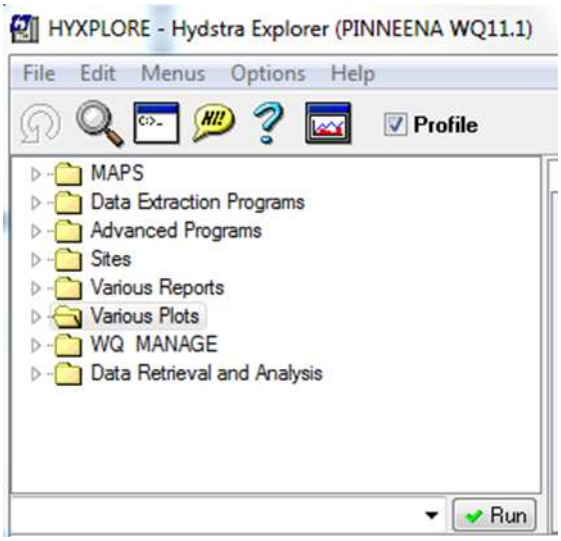


NOTE: There may still need to be some items to be filled in on the parameter screen related to how you want the data to be displayed.

For any field in a parameter screen that has a drop-down arrow next to it, you may select from a list of the allowable entries by clicking on the arrow.

8.0 ANALYSIS PROGRAMS

8.1 General



If, instead of selecting Mapping, you select the option you are presented with another range of menu options as shown above on PINNEENA 11.1. Under each of these menus is either a series of data analyses or database enquiry programs.

8.2 Data Extraction Programs

Many different reports (tabular) and Analyses (generally plot) programs are provided under the menu options. Some examples are Various Reports, Various Plots etc.

All the HYDSTRA continuous data analyses programs under the menus have similar parameter screen formats. These parameter screens are displayed when a program is selected.

To see what each program can do for you, select the program name in the menu and hit<F1> or select the Help Icon or Help menu item.

This will open automatically on the related help details for that program. The help includes sample outputs as well as explanation of what the program does and how it works.

A typical HYDSTRA data analysis program parameter screen is displayed below.

There are some fields on this parameter screen that will be unfamiliar to those users who have not seen HYDSTRA before. Whilst all these fields may not be on all parameter screens, it does give an overview of those fields most commonly found in the HYDSTRA parameter screens.

* **Site**
    - This is the unique number which identifies the site, from which the data is required. The F2 lookup key or clicking with the mouse on the down arrow in the box will allow the user to find the site ID from a gauging site name using the Data Wizard.
* **Data Source**

This is an identifier used to distinguish between different data sources within HYDSTRA on the DVD. The only Data Sources are:

- archive data, for which you use the default - A
- data from the Discrete Monitoring Bores use GWMEAS (1, 1) (2,2) etc.

* **Var From and Var To**

- At a Bore site many types of data may be collected and stored, for example Water Depth, rainfall, EC, etc. As explained in the Data section, this data is differentiated by the variable number. For example:
  - Water level depth in metres - variable number = 110
  - rainfall in millimetres - variable number = 10
  - Not only is the type of data differentiated but the units it is stored in are also differentiated by the variable number. For Example:
  - stream height in decimal feet - variable number = 101
  - rainfall in points - variable number = 9
- this differentiation also allows for the conversion of data between these variables. For example:

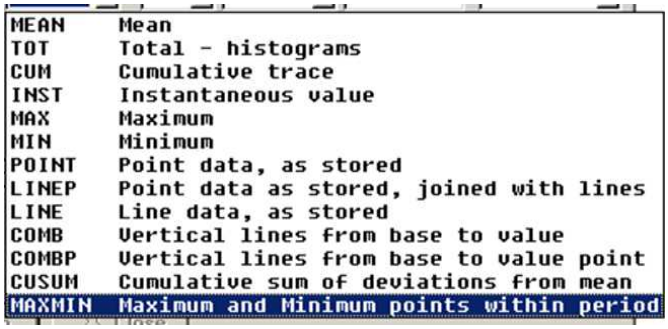
➢ Var From = 110 Var To = 110

This says that no conversion is required, just use the stream height data in metres.

Commonly used variable numbers and conversion are outlined in the Data section.

* **Plot type**

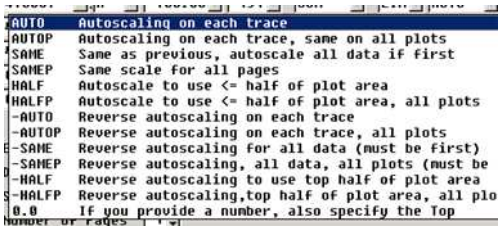
Because of the large amount of data stored it is neither possible nor desirable to plot every data point on a typical trace. Plot type gives the user control over how the data is displayed. However, it does rely on the user understanding how the data is handled by HYDSTRA. A maximum of 35136 intervals may be plotted on a trace with a maximum of 2 points per interval.


MEAN Mean
TOT Total - histograms
CUM Cumulative trace
INST Instantaneous value
MAX Maximum
MIN Minimum
POINT Point data, as stored
LINEP Point data as stored, joined with lines
LINE Line data, as stored
COMB Vertical lines from base to value
COMBP Vertical lines from base to value point
CUSUM Cumulative sum of deviations from mean
MAXMIN Maximum and Minimum points within period

* For data that is stored or computed as continuous data (e.g. Water depth in metres) the following plotting options can be used:
  - MEAN - plots the mean value during the period as a histogram.
  - MIN - plots the minimum value during the period as a histogram
  - MAX - plots the maximum value during the period as a histogram
  - MAXMIN - plots two points in the period, the maximum and the minimum, at the time they occurred in the period.
  - INST - plots the instantaneous value during the period at the time it occurred.
* For discrete data stored as points, e.g. gauging's or water quality sample data
  - POINT - plots discrete points
  - LINEP - produces straight lines between the point values plotted

- COMB and COMBP produce lines between the baseline and the value.

* **Axis, Base, Scale, Period to be Plotted and Period Multiplier**
  - these options allow the user to specify the axes of the plot.
  - in AXIS there are two different axes types that can be specified
    - LIN - normal linear scale
    - LOG - log-log scale


AUTO Autoscaling on each trace
AUTOP Autoscaling on each trace, same on all plots
SAME Same as previous, autoscale all data if first
SAMEP Same scale for all pages
HALF Autoscale to use <= half of plot area
HALFP Autoscale to use <= half of plot area, all plots
-AUTO Reverse autoscaling on each trace
-AUTOP Reverse autoscaling on each trace, all plots
-SAME Reverse autoscaling for all data (must be first)
-SAMEP Reverse autoscaling, all data, all plots (must be
-HALF Reverse autoscaling to use top half of plot area
-HALFP Reverse autoscaling,top half of plot area, all plo
0.0 If you provide a number, also specify the Top

* and with BASE and SCALE the Y axis is defined.
* The default is AUTO in the Bottom field. This automatically selects the best scale to display each separate trace on the plot (ie there may be different scales for different traces on the same plot). “-AUTO” causes automatic scaling with the trace inverted (lowest value at the top, highest at the bottom). This is useful when plotting rainfall and flow on the same set of axes.
  - To define a scale of your choice it is necessary to set values in both Bottom, the minimum value to be displayed on the Y axes and SCALE, the maximum value to be displayed, eg 0 in Bottom and 10,000 in Top.
  - There is also a same option in the Base field. This can be used anytime a scale has been defined by AUTO or by setting the minimum and maximum values. All traces with same will use the defined scale.
* The Each Page Spans field has 7 options; Year, Month, Day, Hour, Minute, Second and Period (of record), while the Time step Multiplier is a number field. Together they define the extent of the time or ‘X’ axis. For example:
  - To plot 10 years of data

    Time step to be Plotted = Year

    Time step Multiplier = 10
  - To plot 8 hours of data

    Time step to be Plotted = Hours

  Time step Multiplier = 8
* **Option**

  - The Options parameter lets you specify a set of advanced options for each trace.

There are two main features that can be controlled by the Options:

You can override the default interval (time step) used by this trace, allowing

you to plot daily or monthly rainfall totals against instantaneous flows

You can force a trace to be coloured according to the quality code of the data in it. This can cause a single trace to be made up of several coloured segments, each representing a run of data with a certain range of quality codes.

If you choose an option with this setting, you must either have one trace only, or have your Stack Traces parameter set to Yes.

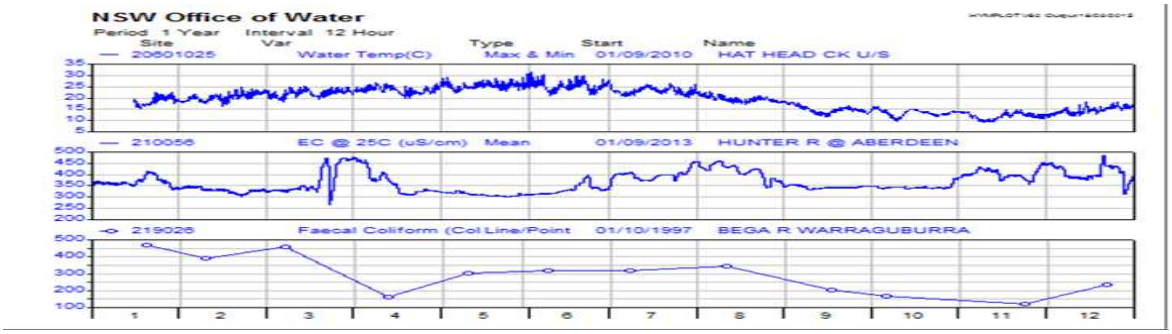
If this parameter is left blank or has a value of NONE, no options are applied.

- **Interval Resolution and Interval Multiplier (Divided into)**
  - these two options define the number of points that are plotted. As mentioned previously there are limits to the number of intervals that can be plotted (max 35,136). If you specify a value other than DEFAULT, the total number of intervals on a trace (Period Multiplier * Period Type) / (Interval Multiplier * Interval Type) may not exceed 35136. You will be informed by the system if this number of points is exceeded.
  - The default option is DEFAULT and 1. With this option the system works out the best interval resolution option to display as much data as possible.
  - To manually select a desired period the system works similarly to Each Page
- **Spans and Period Multiplier above, ie**
  - To plot a point every 10 days

    Interval Resolution = Days

    Interval Multiplier = 10

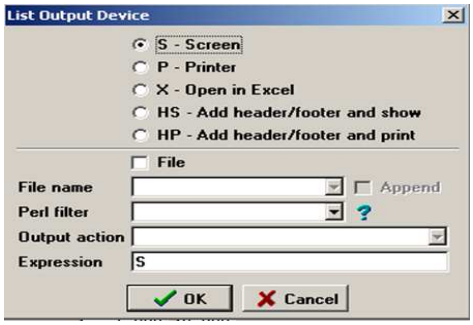
- **Start Time**
  - Once the axes have been defined the start time of the plot is entered.
  - Plots must start on the beginning of a page span unit, eg if the plot spans 6 months the plot must start at 00:00 on the 1st day of a month,.
- **Number of pages**
  - Specifies the number of pages the plot is to span.
- **Stacked Traces**
  - **NO**, the default, allows the user to have several traces on the one set of axes on the page,
  - **YES** allows several sets of axes, one below the next, on the one page, with one trace per set of axes as seen below.


NSW Office of Water
Period 1 Year Interval 12 Hour
Site Var Type Start Name
20501025 Water Temp(C) Max & Min 01/09/2010 HAT HEAD CK U/S
210056 EC @ 25C (uS/cm) Mean 01/09/2013 HUNTER R @ ABERDEEN
219026 Faecal Coliform (Col Line/Point 01/10/1997 BEGA R WARRAGUBURRA

* **Plot Output**
  - This allows the user to specify the output device to which the output should be sent. The default is to the screen. This allows the user to view the data before sending it to the preferred output device.
  - The output device may be a file (six formats available) or to the standard windows printer.

SCR	SCR	Screen Display
WPR	WPR	Standard Windows Printer
BMP	BMP	Windows Bit Map
JP1	JP1	JPEG File
JP2	JP2	JPEG File
JPG	JPG	JPEG File
PN1	PN1	PNG File
PN2	PN2	PNG File
PNG	PNG	PNG File
SVG	SVG	SVG File
WIP	WIP	Windows Interactive Plot File
WIT	WIT	WIP File (Text Format)
WMF	WMF	Windows MetaFile

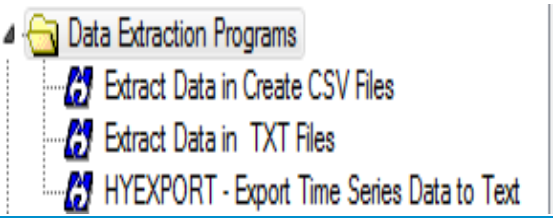
  - If the output standard format is a report (ie text) or there is a plot or print option in the program than there are additional options for output.



X will load the text output into MS Excel. Note: Unless the output is from HYCSV the data will not be automatically formatted into columns

HS and HP will load the text output into MS Word.

8.3 Extraction Programs

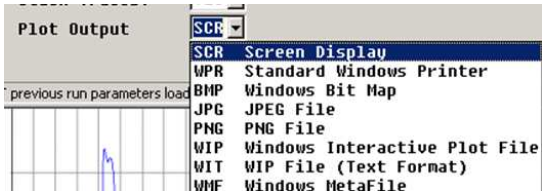

Data Extraction Programs
Extract Data in Create CSV Files
Extract Data in TXT Files
HYEXPORT - Export Time Series Data to Text

Included in the Extraction menu is a section called Extraction Programs.

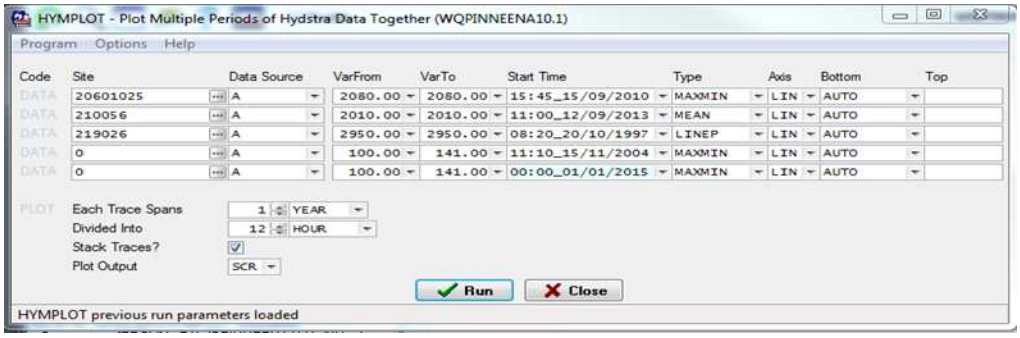
This menu contain direct access to the most commonly used programs in PINNEENA and saves having to hunt through the other menus to find the programs you commonly may wish to use.

8.4 Viewing Outputs

The generated output is displayed in a special viewing window, either as a separate window or as the right hand window in PINNEENA Explore. This special window is automatically run when you select a plot device of SCR (screen) when running a HYDSTRA plot program, or S(creen) as the output device when running HYDSTRA programs that produce text outputs.



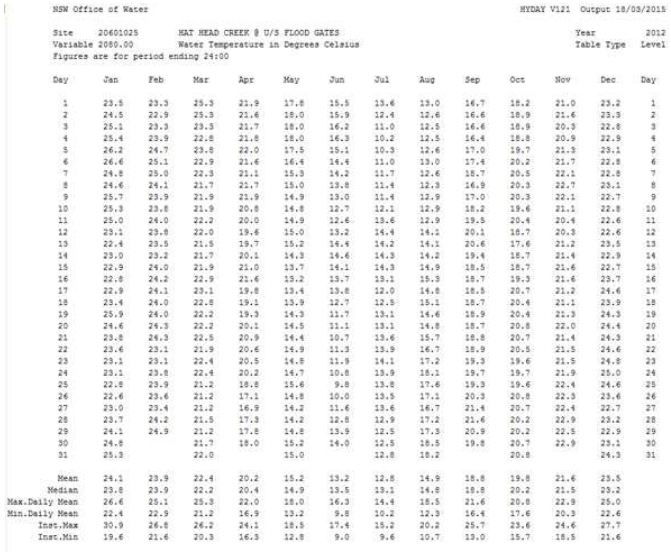
From this window you can format plot and text report files on the screen, and then copy them to the clipboard or send them to your Windows printer.


HYMPLOT - Plot Multiple Periods of Hydstra Data Together (WQPINNEENA10.1)
Program Options Help
Code Site Data Source VarFrom VarTo Start Time Type Axis Bottom Top
DATA 20601025 A 2080.00 2080.00 15:45_15/09/2010 MAXMIN LIN AUTO
DATA 210056 A 2010.00 2010.00 11:00_12/09/2013 MEAN LIN AUTO
DATA 219026 A 2950.00 2950.00 08:20_20/10/1997 LINEP LIN AUTO
DATA 0 A 100.00 141.00 11:10_15/11/2004 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
PLOT Each Trace Spans 1 YEAR
Divided Into 12 HOUR
Stack Traces?
Plot Output SCR
Run
Close
HYMPLOT previous run parameters loaded

The plot shown above has three traces on stacked axes. The top trace shows the maximum or minimum Temperature within a 12 hour period, the middle trace shows 12 hour mean EC@25C and the bottom trace shows the point data for Facial Coliform.

Note: This plot illustrates one of the 'traps for young players' in viewing graphical data.

There are fewer issues in viewing tabular data be it from the data extraction programs or from the programs that produce formatted text outputs. Only the period you have specified is displayed.

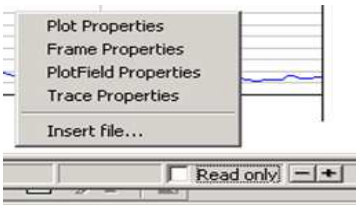


NSW Office of Water HYDAY V121 Output 18/03/2015

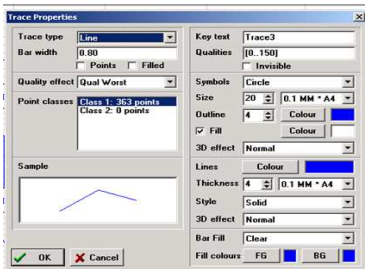
Site 20601025 HAT HEAD CREEK @ U/S FLOOD GATES Year 2012
Variable 2080.00 Water Temperature in Degrees Celsius Table Type Level
Figures are for period ending 24:00

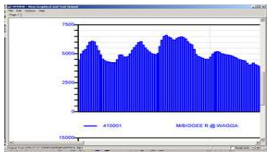
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	23.5	23.3	25.3	21.9	17.8	15.5	13.6	13.0	16.7	18.2	21.0	23.2	1
2	24.5	22.9	25.3	21.6	18.0	15.9	12.4	12.6	16.6	18.9	21.6	23.5	2
3	25.1	23.3	23.5	21.7	18.0	16.2	11.0	12.5	16.6	18.9	20.3	22.8	3
4	25.4	23.9	22.8	21.8	18.0	16.3	10.2	12.5	16.4	18.8	20.9	22.9	4
5	26.2	24.7	23.8	22.0	17.5	15.1	10.3	12.6	17.0	19.7	21.3	23.1	5
6	26.6	25.1	22.9	21.6	16.4	14.4	11.0	13.0	17.4	20.2	21.7	22.8	6
7	24.8	25.0	22.3	21.1	15.3	14.2	11.7	12.6	18.7	20.5	22.1	22.8	7
8	24.6	24.1	21.7	21.7	15.0	13.8	11.4	12.3	16.9	20.3	22.7	23.1	8
9	25.7	23.9	21.9	21.9	14.9	13.0	11.4	12.9	17.0	20.3	22.1	22.7	9
10	25.3	23.8	21.9	20.8	14.8	12.7	12.1	12.9	18.2	19.6	21.1	22.8	10
11	25.0	24.0	22.2	20.0	14.9	12.6	13.6	12.9	19.5	20.4	20.6	22.6	11
12	23.1	23.8	22.0	19.6	15.0	13.2	14.4	14.1	20.1	18.7	20.3	22.6	12
13	22.4	23.5	21.5	19.7	15.2	14.4	14.2	14.1	20.6	17.6	21.2	23.5	13
14	23.0	23.2	21.7	20.1	14.3	14.6	14.3	14.2	19.4	18.7	21.4	22.9	14
15	22.9	24.0	21.9	21.0	13.7	14.1	14.3	14.9	18.5	18.7	21.6	22.7	15
16	22.8	24.2	22.9	21.6	13.2	13.7	13.1	15.3	18.7	19.3	21.6	23.7	16
17	22.9	24.1	23.1	19.8	13.4	13.8	12.0	14.8	18.5	20.7	21.2	24.6	17
18	23.4	24.0	22.8	19.1	13.9	12.7	12.5	15.1	18.7	20.4	21.1	23.9	18
19	25.9	24.0	22.2	19.3	14.3	11.7	13.1	14.6	18.9	20.4	21.3	24.3	19
20	24.6	24.3	22.2	20.1	14.5	11.1	13.1	14.8	18.7	20.8	22.0	24.4	20
21	23.8	24.3	22.5	20.9	14.4	10.7	13.6	15.7	18.8	20.7	21.4	24.3	21
22	23.6	23.1	21.9	20.6	14.9	11.3	13.9	16.7	18.9	20.5	21.5	24.6	22
23	23.1	23.1	22.4	20.5	14.8	11.9	14.1	17.2	19.3	19.6	21.5	24.8	23
24	23.1	23.8	22.4	20.2	14.7	10.8	13.9	18.1	19.7	19.7	21.9	25.0	24
25	22.8	23.9	21.2	18.8	15.6	9.8	13.8	17.6	19.3	19.6	22.4	24.6	25
26	22.6	23.6	21.2	17.1	14.8	10.0	13.5	17.1	20.3	20.8	22.3	23.6	26
27	23.0	23.4	21.2	16.9	14.2	11.6	13.6	16.7	21.4	20.7	22.4	22.7	27
28	23.7	24.2	21.5	17.3	14.2	12.8	12.9	17.2	21.6	20.2	22.9	23.2	28
29	24.1	24.9	21.2	17.8	14.8	13.9	12.5	17.3	20.9	20.2	22.5	22.9	29
30	24.8		21.7	18.0	15.2	14.0	12.5	16.5	19.8	20.7	22.9	23.1	30
31	25.3		22.0		15.0		12.8	15.2		20.8		24.3	31
Mean	24.1	23.9	22.4	20.2	15.2	13.2	12.8	14.9	18.8	19.8	21.6	23.5	
Median	23.8	23.9	22.2	20.4	14.9	13.5	13.1	14.8	18.8	20.2	21.5	23.2	
Max.Daily Mean	26.6	26.1	25.3	22.0	18.0	16.3	14.4	18.5	21.6	20.8	22.9	25.0	
Min.Daily Mean	22.4	22.9	21.2	16.9	13.2	9.8	10.2	12.3	16.4	17.6	20.3	22.6	
Inst.Max	30.9	26.8	26.2	24.1	18.5	17.4	15.2	20.2	25.7	23.6	24.6	27.7	
Inst.Min	19.6	21.6	20.3	16.3	12.8	9.0	9.6	10.7	13.0	15.7	18.5	21.6	

8.4.1 Modifying Outputs



There are a range of things that can be done to modify the outputs produced. Clearing the Read Only box and right clicking on a graph will produce the menu on the left and give you the option to change a range of graph properties. You may also right click on text for further options.





Holding down the left mouse button and swiping a box over selected trace, then selecting the Trace Properties option allows you to modify the trace and text attributes on the diagram.

8.4.2 Zoom Facility

There are also zoom buttons in the lower right hand corner which will allow you to zoom in and out of a graphics window or change the Font size in a text window.

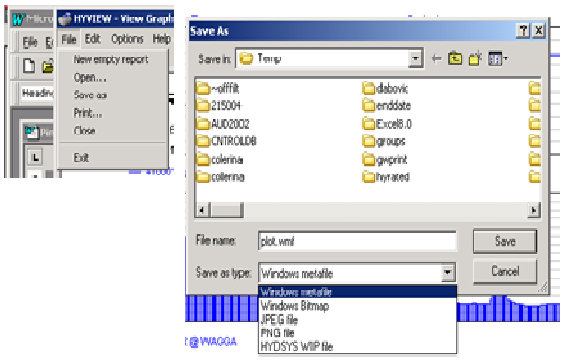
This zoom effect only changes the image on the screen.

If you save, print, copy, etc. these actions are performed on the total image and not just the zoomed portion in the window.

8.4.3 Useful Menu Options

File

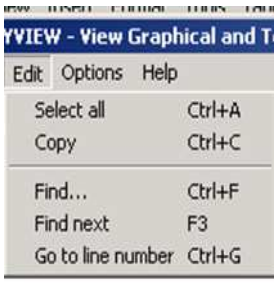
File | Save As - Saves the current report (to a text file) or the current plot file to a range of file formats as shown below:



File | Print - Prints the current page to the default windows print device which can be a printer, plotter, fax, etc.

8.4.4 Edit

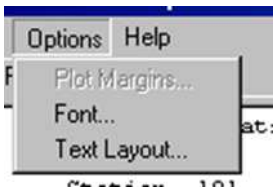
Undo, Cut, Select All, Paste, Find, Find Next and Go to all only work with Text files. Their operation is the same as standard windows operations ie Cut - Cuts the currently selected text into the clipboard.



Edit | Copy - For plots, this copies the current plot to the clipboard, so that you can paste it into Microsoft Word, or any other program that accepts pasting Windows Metafile data.

For text reports, it copies the currently selected (highlighted) data into the Windows clipboard as plain text.

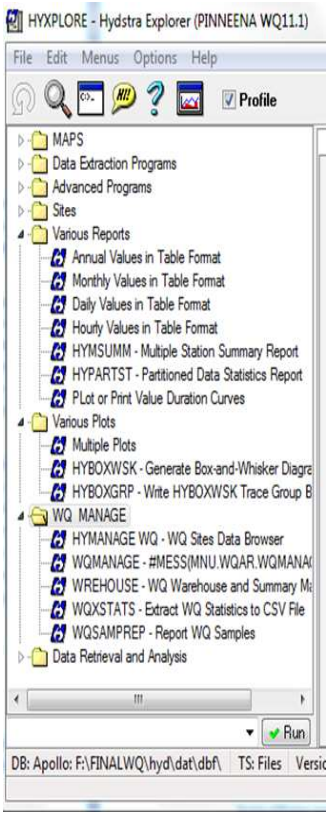
8.4.5 Options



Options items lets you specify the layout (Plot Margins and Text Layout) of the plot or text on the page to be printed. Font… allows the text reports fonts to be specified.

9.0 DATABASE PROGRAMS

9.1 General


HYXPLORE - Hydstra Explorer (PINNEENA WQ11.1)
File Edit Menus Options Help
Profile
MAPS
Data Extraction Programs
Advanced Programs
Sites
Various Reports
Annual Values in Table Format
Monthly Values in Table Format
Daily Values in Table Format
Hourly Values in Table Format
HYMSUMM - Multiple Station Summary Report
HYPARTST - Partitioned Data Statistics Report
PLot or Print Value Duration Curves
Various Plots
Multiple Plots
HYBOXWSK - Generate Box-and-Whisker Diagra
HYBOXGRP - Write HYBOXWSK Trace Group B
WQ_MANAGE
HYMANAGE WQ - WQ Sites Data Browser
WQMANAGE - #MESS(MNU.WQAR.WQMANA
WREHOUSE - WQ Warehouse and Summary Ma
WQXSTATS - Extract WQ Statistics to CSV File
WQSAMPREP - Report WQ Samples
Data Retrieval and Analysis
Run
DB: Apollo: F:\FINALWQ\hyd\dat\dbf\
TS: Files

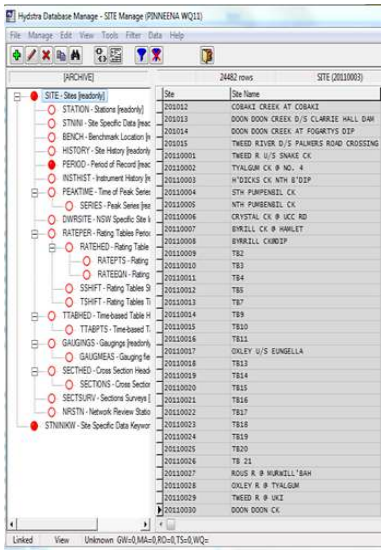
The other type of data that will be encountered is the database enquiry screen. Like the data analysis programs a consistent screen format, similar to that shown below, is used.

Data in HYDSTRA is stored in two ways. Time series data (a series of times and data values) is stored in a compressed and encoded format, and can only be accessed by HYDSTRA programs. Most other ancillary information – information about the site, ratings, cross sections etc. - is stored in a series of tables in the \HYD\DAT\DBF directory.

Many of the databases within HYDSTRA consist of several data tables with a parent-child relationship. That is, the key field (s) of one (parent) table is part of a multiple key in the child table. A system of parent – child tables is referred to as a system or manage. It is possible for some tables to be in more than one system. You may see an example of this by doing the following:-

Select **HYMANAGE WQ** – WQ Sites Data Browser.

This will show the first entry in the SITE table



The relationships of the SITE related tables are shown on the left side of the screen, as below.

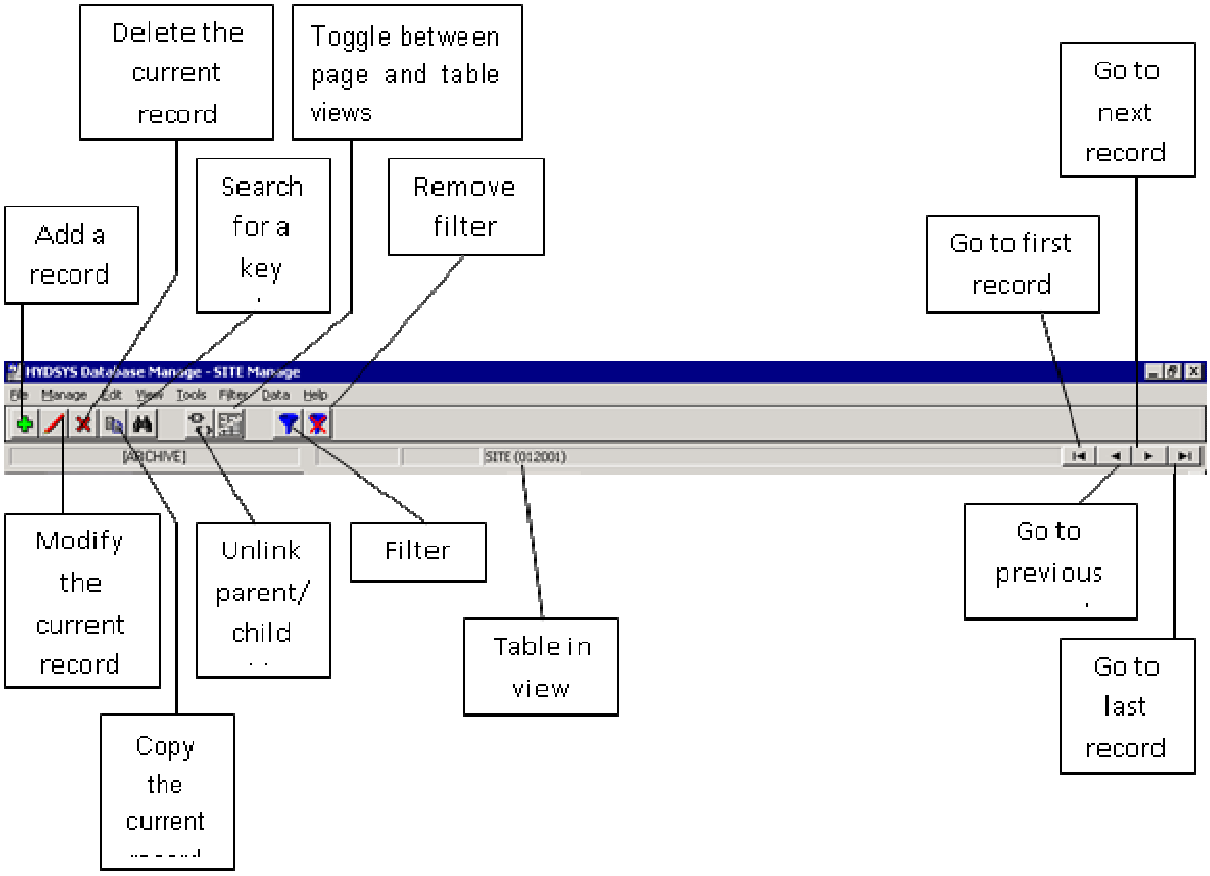
The red dots indicate that the database manage program is reading the databases are read only. This is a necessary result of working from a database on the DVD

This means that you will not be able to change any database data but you can still have full access to read and copy the data.

This structure tells us that the parent table is SITE.

SITE, DWRSITE, STNINI, are child tables of SITE.

Across the top of the screen is a menu bar and toolbar which allow various operations on the table.



When you select any of the following from the HYDSTRA main menu you will be taken to the first .record in the parent table of the system you have selected.

A number of Ctrl-key commands are provided to allow manipulation and extraction of information from tables. These are also available on the drop-down menus at the top of the screen. Some tables have drop down menu entries specific to them, particularly under the Options heading.

Some of these operations, for example searching and filtering, allow you to make selections within them. To use these shortcuts, hold down the Ctrl key and press the appropriate letter.

The shortcuts and their meanings are as follows:-

<b> Toggle between **browse** (spreadsheet style view of all records) and screen form mode (full field view for a single site).

<f> **Find** the record that has the key field(s) that you enter. If you are in a child table, the parent keys will be defaults, and only the keys specific to the child table need to be entered.

<g> **Extract statistics of numerical fields in the table**. For example, in the SITE table, you could extract a sum, average, maximum, minimum and count of the values in say, the Elevation field.

<i> **Create a filter** that will only show some of the entries in the table. The filter may be based on the contents of one of the fields in the table, or it may be a HYSTNS expression. Moving through the selection groups will create a Dbase

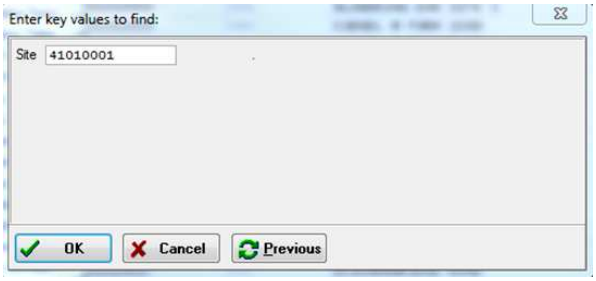
expression, which may be modified before applying the filter. Once a filter is set, any operation that you perform on all records, for example, deletion, will only operate on those records that have been passed by the filter.

<l> Toggles between **link and unlink**, when in a child table. Normally, when you are in a child table, you will only see the records that have the same key field values as the parent that you entered through. By unlinking, you will be able to see other entries in the table. Re-linking may not always return you to the original parent.

<p> **Print** the information on the screen. HYDSTRA supports an expanded printing function that allows the production of specialised reports applicable to each table or system. It also allows you to tailor your own reports using the List selected fields option.

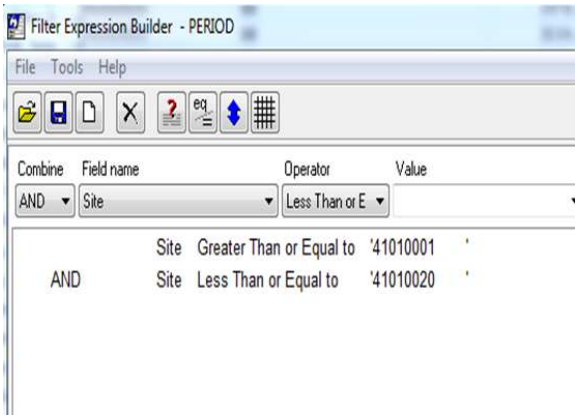
Tables in the SITE system are accessed by first finding the site of interest. Do this by entering the site system, and clicking the search button or **<Ctrl> <f>**. Enter the site identifier in the search box and clock **OK**.

The following dialog box appears and you are requested to enter the site number of interest or one close to it.



You may also find sites of interest by filtering.

To do this, click on the Filter button or press **<Ctrl> <i>** to bring up the filter window.

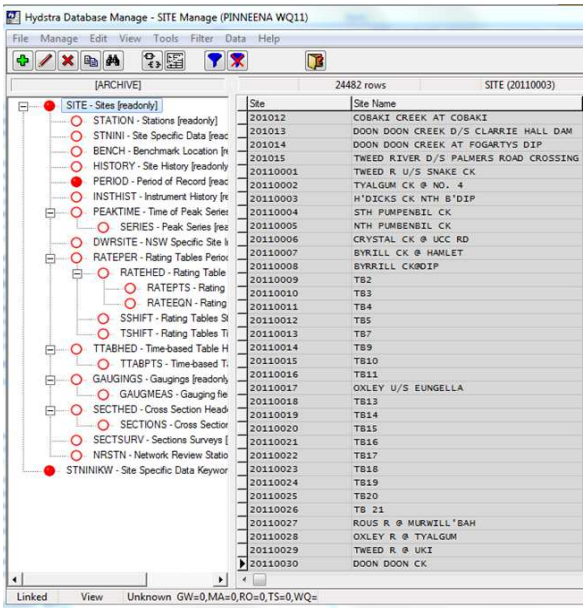


From here you may enter multiple filter parameters. Usually, the easiest way to use the filter builder is by selecting fields and operators from the drop-down boxes, and entering a value in the Value window. For complex filter expressions, though, it is sometimes necessary to toggle the view to dBase expression format. This allows you to add brackets to the filter expression. You may change the .AND. operator to .OR. by selecting the line and right clicking.

This will display the first site selected. You may scroll through the selected sites one record at a time using the arrows in the top right hand corner, or you may toggle to a table view and click on the site you want.

You can toggle between Form and Browse views at any time using the toggle button.

Form View – all fields for one site

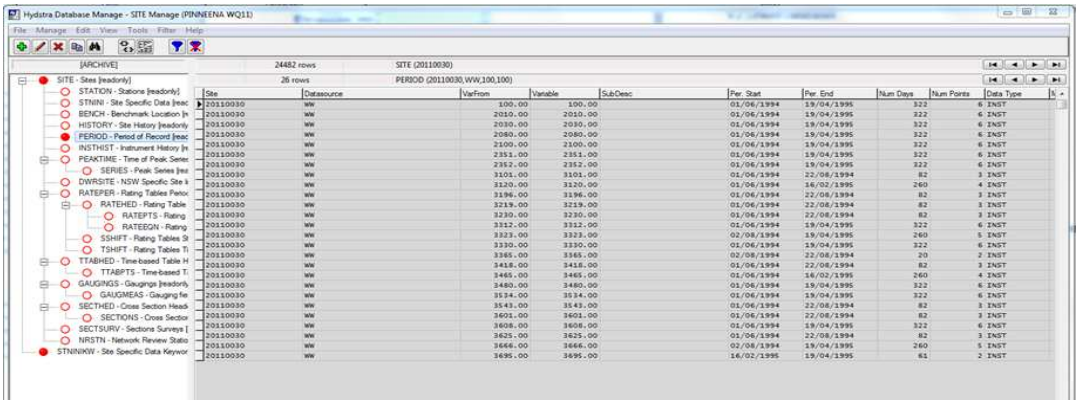


Browse View – view all fields for all tables

9.2 Linked Databases

All databases have a field or set of fields that uniquely identifies every record. Typically this is the eight character site number or site identifier. This is called the primary key of the table. Records are generally shown sorted by the primary key. The key is also used to define hierarchical relationships between tables. Many database programs will display a hierarchy of tables from a single screen. There will be the “parent” table, at the top of the hierarchy, with possibly several “child” and “grandchild” tables below.

What this means is that if you select site 41010001in the SITE database above you will not only see the SITE record(s) for 41010001, you will also see the STATION record(s) for 41010020. Similarly PERIOD records etc.



To see the records for 20110030 we have to go back to the parent or top table (SITE) and select 20110030.

In the box at the left of the screen, all the tables in the system are displayed. You can choose the database you wish to be active by clicking on it. This will display the first entry for that site in the database you select.

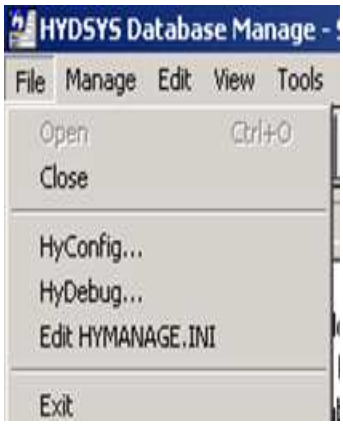
9.3 Menu Options

Access the full range of database menu options, can be gained by :

1. Moving the mouse across the menu item and selecting the desired option,
2. using the short cut keys (see above), or
3. clicking on one of the toolbar buttons.

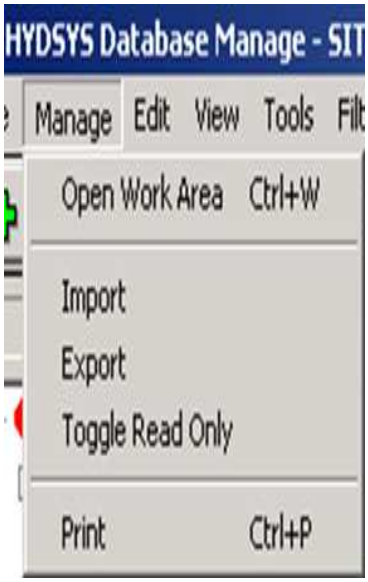
The database function keys only operate on the opened screen.

9.3.1 File



* Close – closes the currently open table
* HYCONFIG – allows you to make temporary changes to timeouts, paths etc. This will not usually need to be used.
* HYDEBUG – If you have problems running Pinneena, OFFICE or HYDSTRA may request you to run a program in debug mode. This will create huge files.
* Edit HYMANAGE.INI. - Not required.
* Exit – Exits the database system.

9.3.2 Manage



* Open work area – It is possible to export data from database tables to a work area, where they will be stored in the same format and structure as the archive tables. You may use Pinneena to make changes to the data in these work areas.
* Export – exports Pinneena data to a .CSV file or a work area.
* Import – may be used to import data from a .CSV file to a work area
* Toggle read only – toggles work areas between writeable and read-only. Writeable tables are shown with green dots next to them, read-only tables have red dots.
* Print – access to standard reports

9.3.3 Edit

* Add, Modify, Delete and Copy Record – allow you to make changes to tables in work areas only
* Other Page - for multipage screens

9.3.4 View

* Link / Unlink – links and unlinks parent and child tables.
* Browse/Form – toggles between table and form views.

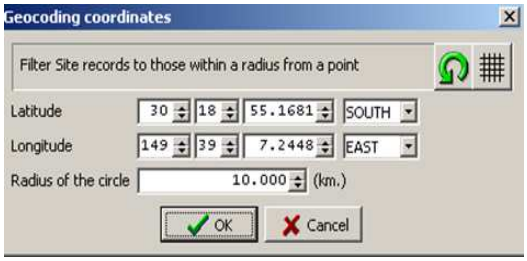
9.3.5 Tools

* Orphan Records & Validate Data – not available in Pinneena
* Statistics – calculates basic statistics on numerical data in the table
* Documents – shows documents and photographs related to the site

9.4 Filter

* User filter – allows you to set a filter as described above.
* HyStns Filter – allows you to filter on a list of sites created from the contents of a file or directory. For details, see the HYDSTRA documentation.

9.4.1 From a Point


Geocoding coordinates
Filter Site records to those within a radius from a point
Latitude 30 18 55.1681 SOUTH
Longitude 149 39 7.2448 EAST
Radius of the circle 10.000 (km.)
OK
Cancel

* Radius from a point – filters to all sites within a nominated radius from a point.

9.4.2 From a Rectangle

Filter SITE records within a specified rectangle
Deg Min Sec Hem
Corner 1 Latitude 30 18 55.1681 S
Corner 1 Longitude 149 39 7.2448 N
Corner 2 Latitude 30 18 55.1681 S
Corner 2 Longitude 149 39 7.2448 N
OK
Cancel

* Rectangle Filter

  (Give corner co ordinates)

9.5 Data

* Not applicable to PINNEENA

9.6 Help

* Help on this table - provides information about the table in use, including its structure and the types of fields
* On this manage - displays system information
* Help on HYMANAGE – provides documentation and general information about using the databases
* About – displays version, release and storage usage information about HYMANAGE.

Appendix A - WQ Data from Manually Sampled sites,

1.0 Manually Monitored Sites

1.1 Site Numbering

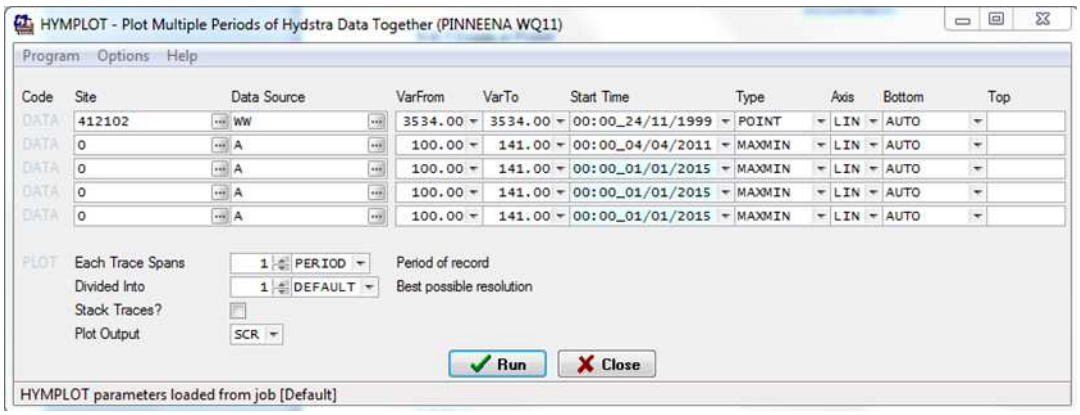
Sites are either at Gauging Stations (eg: 412136)/ Bores(GW036927) or at locations along the river and away from Stream Gauging stations (20610001) .

1.2 Data Source

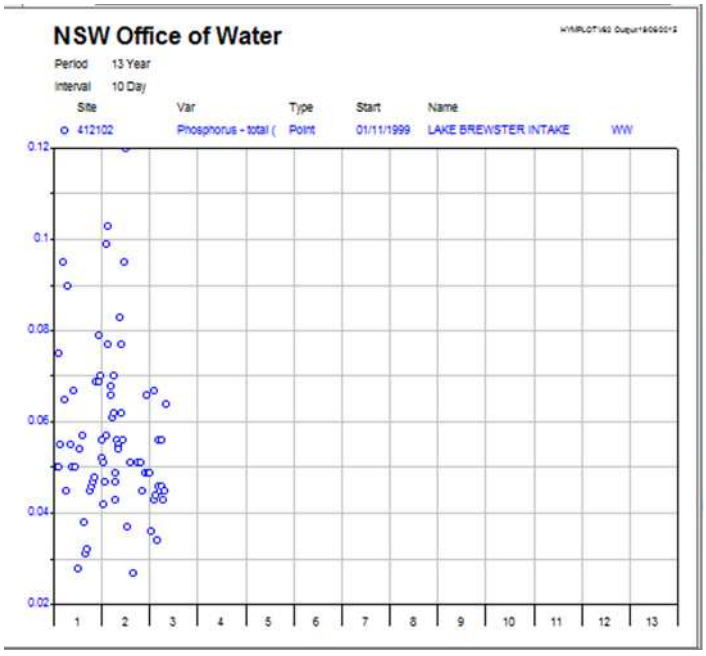
For these bores 'Data Source' to be used is WW. An example for 412136 (which is a manually monitored bore) is shown below.

1.3 Variable

There are variables ranging from 2010 to 3725 (Barometric Pressure).


HYMPLOT - Plot Multiple Periods of Hydstra Data Together (PINNEENA WQ11)
Program Options Help
Code Site Data Source VarFrom VarTo Start Time Type Axis Bottom Top
DATA 412102 WW 3534.00 3534.00 00:00_24/11/1999 POINT LIN AUTO
DATA 0 A 100.00 141.00 00:00_04/04/2011 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
DATA 0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
PLOT Each Trace Spans 1 PERIOD Period of record
Divided Into 1 DEFAULT Best possible resolution
Stack Traces?
Plot Output SCR
Run
Close
HYMPLOT parameters loaded from job [Default]

Outputs



2.0 Continuously Monitored WQ Sites

2.1 Stream Gauges and Bores

2.1.1 Six Digit Gauging Stations and Bores

Continuously monitored gauging stations are mostly six digit sites and few eight digit stations (e.g.: 41200208). Continuously Monitored bores mostly measure temperature and few bores measures EC as well.

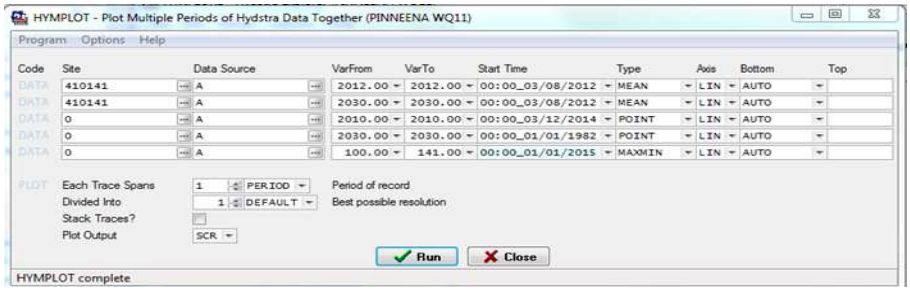
2.1.2 Data Source

For these bores 'Data Source' to be used is A, CP & PROV.

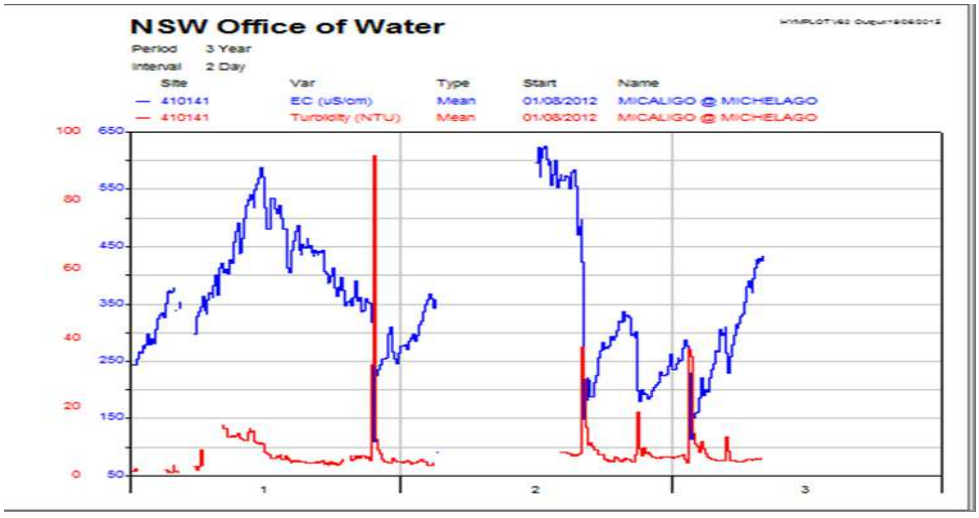
2.1.3 Variable

There are variables ranging from 2010(EC@250), 2012(EC), 2030(Turbidity), 2070 (Humidity), 2080(Temperature), 2169(Total Dissolved Salts) , 2100(pH) & 2352 (dissolved Oxygen).

2.1.4 Input Screen


HYMPLOT - Plot Multiple Periods of Hydstra Data Together (PINNEENA WQ11)
Program Options Help
Code Site Data Source VarFrom VarTo Start Time Type Axis Bottom Top
410141 A 2012.00 2012.00 00:00_03/08/2012 MEAN LIN AUTO
410141 A 2030.00 2030.00 00:00_03/08/2012 MEAN LIN AUTO
0 A 2010.00 2010.00 00:00_03/12/2014 POINT LIN AUTO
0 A 2030.00 2030.00 00:00_01/01/1982 POINT LIN AUTO
0 A 100.00 141.00 00:00_01/01/2015 MAXMIN LIN AUTO
Each Trace Spans
Divided Into
Stack Traces?
Plot Output
PERIOD
DEFAULT
SCR
Period of record
Best possible resolution
Run
Close
HYMPLOT complete

2.1.5 Output


NSW Office of Water
Period 3 Year
Interval 2 Day
Site Var Type Start Name
410141 EC (uS/cm) Mean 01/08/2012 MICALIGO @ MICHELAGO
410141 Turbidity (NTU) Mean 01/08/2012 MICALIGO @ MICHELAGO

3.0 Plots from MAPS

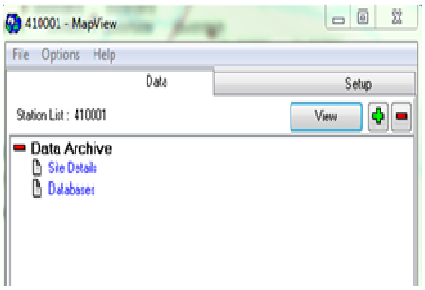
3.1 General

There are three Maps provided and use as following

1. NSWWQAll
2. NSW WQ MANUAL
3. NSW WQ CONTINUOUS

3.1.1 WQ All Sites

NSW WQ All shows all the sites including the Manually Monitored bores and Continuously Monitored bores. By right clicking at the station



* This Map only shows the site details.
* By double clicking site details this will shows the site details or selecting period it will show the period of data against the datasource.

3.1.2 WQ Manual

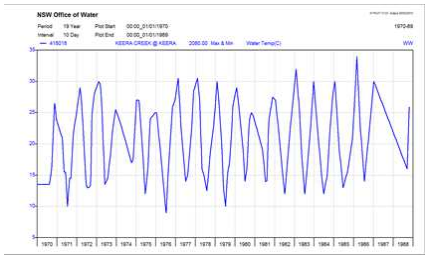
NSW WQ Manual shows all the sites Manually Monitored.

By choosing Global Applications- For Surface Water Stations)or Applications - For Ground Water Bores we could get a plot for Conductivity, Temperature, Turbidity etc. if the data available in WW data source.

Sample plot for this site is shown below:

Plot for Temperature

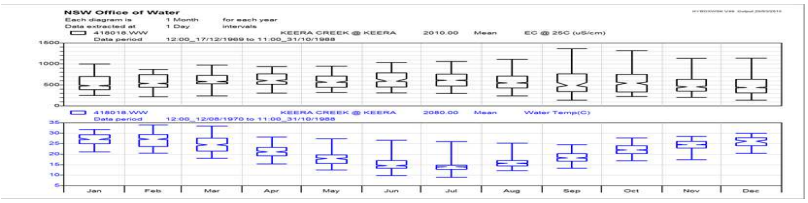
Plot for EC



Plot for Turbidity

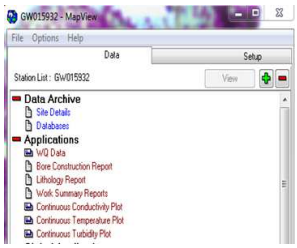
Similarly NSW WQ Continuous designed to use for Continuously Monitored bores/

3.2 Typical Box and Whisker Diagrams

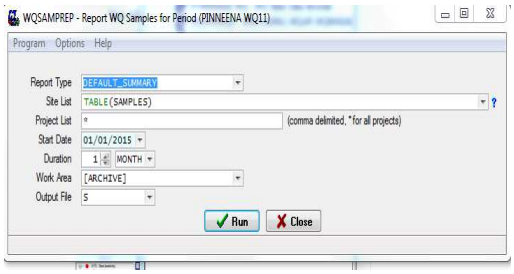


3.3 Plots , etc

Provision is available to have Bore Construction Report, Lithology Report, Work Summary Reports etc are available in Applications section in 'NSW WQ Map MANUAL'.Provisions are available for Conductivity, Temperature and Turbidity Plots if the data is available for the station/Bore



3.4 WQSAMPREP



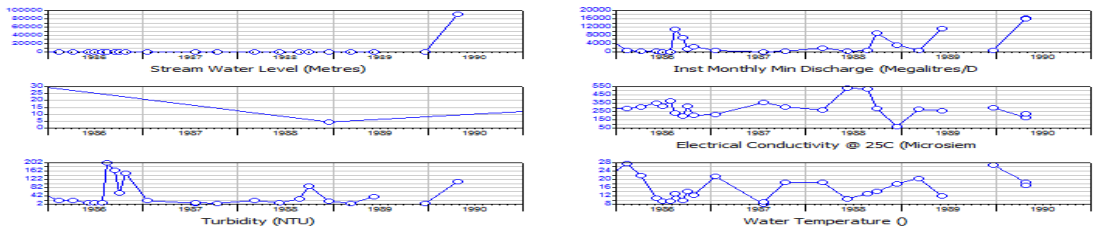
This program plots parameters from the startdate to duration and also gives the statistics lilke minimum, maximum and median etc

Table & Plot for 421004 from 01/01/1986 to 1991.

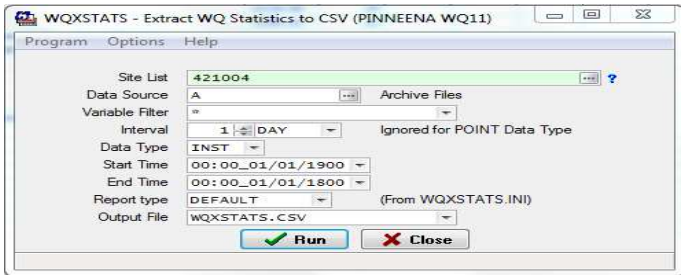
Site: 421004
Site Name: MACQUARIE RIVER AT WARREN WEIR

Name	Variable	count	min	max	mean	50%	90%	3dgm
Stream Water Level (Metres)	0100.00	24	1	90420	7533	2	3	2949
Inst Monthly Min Discharge (Megalitres/D	0141.00	24	63	16483	3567	708	11108	14304
	0845.00	1						
Electrical Conductivity @ 25C (Microsiem	2010.00	24	68	531	292	292	376	472
Turbidity (NTU)	2030.00	24	4	202	47	20	138	171
Water Temperature O	2080.00	24	8	28	16	14	26	27
pH (pH units)	2100.00	24	7	8	8	8	8	8
Total Organochlorines (Milligrams/Litre)	3101.00	24	39	177	98	99	130	161
Total Organochlorines (Micrograms/Litre)	3102.00	24	0	0	0	0	0	0
	3178.00	24						
	3196.00	24						
	3219.00	24						
	3256.00	22						
Methamidophos ???10265-92-6 (Micrograms/	3348.00	23	0	1	0	0	0	0
	3384.00	14						
	3385.00	19						
	3418.00	24						
	3466.00	24						
Bendiocarb 22781-23-3 (Micrograms/L	3527.00	1	0	0	0	0	0	
	3534.00	22						
	3542.00	24						
	3589.00	24						
	3600.00	24						
	3621.00	4						
	3625.00	24						
	3658.00	1						
	3718.00	11						

Plot of Water Quality Parameters



3.5 WQSTATS



This will provide all statistics information like Max,Min,Mean etc for the selected period for a station or site list for intervals as choosen.

APPENDIX B – Water Quality Variables (Name/No))

Variable No	Variable Name	VARUNIT	UNITCODE
2	Rainfall - Throughfall (millimetres)	mm	SCAL
3	Rainfall - Stemflow (millimetres)	mm	SCAL
8	Cumulative Rainfall	mm	MM
9	Rainfall Points	PT	
10	Rainfall Millimetres	MM	
11	Antecedent Precip Index ()	SCAL	
12	Rainfall Duration ()	SCAL	
13	Wet Day ()	SCAL	
14	Dry Day ()	SCAL	
15	Mannings n	SCAL	
20	Rainfall Intensity	mm/hr	MMH
21	Max Rain Intensity 1 Y ARI (Millimetres/		SCAL
22	Max Rain Intensity 2 Y ARI (Millimetres/		SCAL
23	Max Rain Intensity 5 Y ARI (Millimetres/		SCAL
24	Max Rain Intensity 10 Y ARI (Millimetres		SCAL
25	Max Rain Intensity 20 Y ARI (Millimetres		SCAL
26	Max Rain Intensity 50 Y ARI (Millimetres		SCAL
27	Max Rain Intensity 100 Y ARI (Millimetre		SCAL
30	SOUTHERN OSCILLATION INDEX	SCAL	
50	Rainfall Energy (Rosewell)	Megajoules/ha.mm	MJSM
52	Rainfall Energy (Rosewell)	Megajoules/hectare	MJSM
55	Rainfall Energy (Wisch & Smith)	Megajoules/ha.mm	MJSM
56	Rainfall Energy (Wisch & Smith)	Megajoules/ha.h	MJSM
60	Discharge Pressure (Metres)	SCAL	
70	Air Vessel Pressure (Metres)	SCAL	
100	Stream Water Level	Metres	M
101	Stream Water Level	Feet	FOOT
110	Bore Water Level below Measuring Pt	Metres	M
111	Water Table Level (Metres)	SCAL	
112	Natural Surface Level (Metres)	SCAL	
113	Bore Water Level below Ground level	Metres	M
114	Height above sensor (m)	metres	M
115	Groundwater Level - AHD	METRES	M

116	Steam Water Level m AHD	Meters AHD	M	
130	Reservoir Water Level	Metres	M	
131	Weir and Storage Level m AHD	Metres AHD	M	
132	Reservoir Level (Operational)	Metres	M	
133	Topographic Surface (Land) Area	Hectares	HA	
134	Reservoir Volume in Storage	Gigalitres	GL	
135	Spillway Discharge	Cumecs	CUMC	
136	Reservoir Volume in Storage	Megalitres	ML	
137	Reservoir Surface (Water) Area	Hectares	HA	
138	% Full Supply Volume	%	PERC	
139	Reservoir Volume (Operational)	Megalitres	ML	
140	Discharge Rate	Cumecs	CUMC	
141	Discharge Rate	Megalitres/Day	MLD	
142	Stream Discharge (Operational)	Megalitres/Day	MLD	
143	Stream Discharge	Litres/second	LS	
144	Stream Discharge	Cubic Feet/Second	CFS	
145	Dam Inflow	ML/day	MLD	
146	Flow Duration Percentile	Percentile	PERC	
147	Modelled Stream Discharge	Megalitres/Day	MLD	
148	Discharge Rate	l/s	LS	
149	Bore Extraction Volume	Megalitres	ML	
150	Discharge Volume	Cubic Metres	M3	
151	Discharge Volume	Megalitres	ML	
152	Discharge Volume	Acre Feet	ACFT	
153	Discharge Volume	Litres	L	
155	Total Flow	terralitres	TL	
421	Natural Inflow	Megalitres	ML	
422	Net Reservoir Inflow 24hours	Megalitres	ML	
429	Gross 24h Reservoir Inflow	Megalitres	ML	
431	Valve Releases	Megalitres/day	MLD	
432	Hydro Releases	Megalitres/day	MLD	
433	Spillway Discharge	Megalitres/day	MLD	
434	Flow through Penstock Ml/d	megalitres per day	MLD	
439	Total Storage Releases	Megalitres/day	MLD	
440	Full Supply Capacity	Gigalitres	GL	

441	Full Supply Capacity	Megalitres	ML
442	Dead Storage Capacity	Megalitres	ML
443	Effective Volume in Storage	Megalitres	ML
444	Effective Full Storage Volume	Megalitres	ML
448	% Effective Full Storage Volume	%	PERC
451	Storage Releases Valve 24 hours Total	Megalitres	ML
452	Storage Releases Hydro 24 hour Total	Megalitres	ML
453	Spillway Discharge 24 hour Total	Megalitres	ML
454	Storage Sluice Release 24 Hr Total	Megalites	ML
455	Storage Releases Misc. 24 hour	Megalitres	ML
459	Storage Releases 24 hour Total	Megalitres	ML
463	Spillway Release Volume	Megalitres	ML
470	Hollow Jet valve Position	% of full opening	PERC
475	Rotary Gate Position Indicator		SCAL
480	Total Cloud Amount	Oktas	SCAL
500	Wind Direction	Degrees	DEG
501	Corrected Wind Direction (Degrees (compa		SCAL
502	Standard Deviation Wind Direction (Degre	degrees	DEG
510	Wind Speed (km/hr)	kilometres per hour	SCAL
512	Wind Gust Max Velocity ()		SCAL
513	Maximum Wind Speed (m/s)	m/s	MS
514	Average wind Speed (m/s)	metres per second	MS
515	Wind Speed	Metres/Second	MS
518	wind run	metres	M
519	Wind Run	Km	KM
520	Wind Run Rate	Km/day	KMD
521	Wind Run (below 3m) ()		SCAL
550	Barometric Pressure	Hectopascal	HPA
552	Barometric Pressure Adj to Sea Level HPa	hectopascals	HPA
560	Surface Direction (Degrees (compass))		SCAL
570	Surface Temperature ()		SCAL
571	Cabinet Temperature (C)	Degrees C	DEGC
600	Stream Cross Section Data	Metres	M
601	Stream Cross Section Elevation (Metres)		SCAL
602	Stream Cross Section Chainage (Metres)		SCAL

610	Stream Cross Sectional Area ()		SCAL	
620	Distance accross River (Metres)		SCAL	
621	Distance down River (Metres)		SCAL	
622	Distance upstream (Metres)	SCAL		
623	Distance from left bank (Metres)		SCAL	
624	Distance from right bank (Metres)		SCAL	
630	Distance below Water Surface (Metres)			SCAL
631	Distance from Bottom (Metres)		SCAL	
632	Depth of pump inlet below ground (bore)			SCAL
651	Pressure in Water Retic System ()		SCAL	
653	Pipe Pressure (KiloPascals) ()		SCAL	
654	Pipe pressure (MegaPascals) ()		SCAL	
655	Pipeline Level (Pressure Head) (Metres			SCAL
700	Evaporation from a U.S. Class A Pan		Millimetres	MM
710	Evaporation from Australian Standard Pan		Millimetres	MM
715	Evaporation Megalitres	ML		
720	Effective Evaporation (Gigalitres)		SCAL	
721	Potential Evapotrans. (Penman/Monteith)		millimetres	MM
730	Sunshine Duration in Hours ()		SCAL	
740	Total Solar Radiation ()	megajoule/sq. meter	SCAL	
750	Solar Radiation Intensity	Watts/Square Metre	WSM	
751	Solar Radiation Intensity ()	SCAL		
752	Solar Radiation > 80 Kj/sq.m ()		SCAL	
755	Solar Radiation - Global ()	SCAL		
756	Solar Radiation - Diffuse ()	SCAL		
760	Soil Moisture Percent	SCAL		
761	Average Soil Moisture (Percent)		SCAL	
765	Soil Moisture Capillary Pressure ()		SCAL	
770	Surface Moisture (Percent)	SCAL		
775	Soil Temperature ()	SCAL		
2001	Salinity (UNESCO Formula)	Practical Salinity		SCAL
2003	Total Salt Load Rate ()	SCAL		
2005	Salt Load Rate ()	SCAL		
2006	Salt Transport (Tonnes/day)	Tonnes/Day (t/day)		TOND
2007	Total Salt Load (Tonnes)	Tonnes (t)	TONN	

2008	Flow weighted salt concentration	mg/L	MGL
2010	Electrical Conductivity @ 25deg. C	microsiemens/cm	MISC
2011	Electrical Conductivity (uncorrected)	millisiemens/cm	MSCM
2012	Electrical Conductivity (uncorrected)	microsiemens/cm	MISC
2015	Temperature Correction Factor (for EC)		SCAL
2021	Specific Gravity (Grams/mL)	g/mL	SCAL
2023	Viscosity ()		SCAL
2030	Turbidity	NTU	NTU
2040	Transmissivity (Percent)		SCAL
2046	Transparency (secchi depth) (Metres)		SCAL
2049	Gilvin Absorbtion ()		SCAL
2051	Colour Hu		SCAL
2053	Colour - Apparent (Hazen units)		SCAL
2060	Dry Bulb Temperature	Degrees Celsius	DEGC
2061	Dry Bulb Temp (Corrected) ()		SCAL
2062	Ambient Air Temperature	Degrees Celsius	DEGC
2063	Mean air temperature (Degrees C)	Degrees Celsius	DEGC
2065	Air Temperature ()		DEGC
2066	Maximum Air temperature (Degrees C)	Degrees Celsius	DEGC
2067	Minimum Air temerature (Degrees C)	Degrees Celsius	DEGC
2068	Wet Bulb Temperature	Degrees Celsius	DEGC
2069	Dew Point ()		SCAL
2070	Humidity	Percent	PERC
2071	Relative Humidity (Corrected) (Percent		SCAL
2072	Maximum Relative Humidity	Percent	PERC
2073	Minimum Relative Humidity	Percent	PERC
2074	Vapour Pressure	Millimetres	MM
2075	Relative Humidity (Percent)		SCAL
2080	Water Temperature	Degrees Celsius	DEGC
2081	Water Temp Corr Factor ()		SCAL
2100	pH	pH	PH
2169	Inst. Salinity (Total Dissolved Salts)	Milligrams/Litre	MGL
3000	1\0441\0441\0442-Tetrachloroethane	\193g/L	UT
3001	1\0441\0441-Trichloroethane \193g/L		UT
3002	1\0441\0442\0442-Tetrachloroethane (630-20-6)	\193g/L	UT

3003	1\0441\0442\0442-Tetrachloroethane (79-34-5)	\193g/L	UT
3004	1\0441\0442-Trichloroethane	\193g/L	UT
3005	1\0441-Dichloroethane	\193g/L	UT
3006	1\0441-Dichloroethene	\193g/L	UT
3007	1\0441-Dichloropropene	\193g/L	UT
3008	1\0442\0443-Trichlorobenzene	\193g/L	UT
3009	1\0442\0443-Trichloropropane	\193g/L	UT
3010	1\0442\0444\0445-Tetrachlorobenzene	\193g/L	UT
3011	1\0442\0444-Trichlorobenzene	\193g/L	UT
3012	1\0442\0444-Trimethylbenzene	\193g/L	UT
3013	1\0442-Dibromo-3-chloropropane	\193g/L	UT
3014	1\0442-Dibromoethane	\193g/L	UT
3015	1\0442-Dichlorobenzene	\193g/L	UT
3016	1\0442-Dichloroethane	\193g/L	UT
3017	1\0442-Dichloropropane	\193g/L	UT
3018	1\0443\0445-Trichlorobenzene	\193g/L	UT
3019	1\0443\0445-Trimethylbenzene	\193g/L	UT
3020	1\0443\0445-Trinitrobenzene	\193g/L	UT
3021	1\0443-Dichlorobenzene	\193g/L	UT
3022	1\0443-Dichloropropane	\193g/L	UT
3023	1\0444-Dichlorobenzene	\193g/L	UT
3024	1 - Butene	\193g/L	UT
3025	1-Napthylamine	\193g/L	UT
3026	2\0442-Dichloropropane	\193g/L	UT
3027	2\0443\0444\0446-Tetrachlorobenzene	\193g/L	UT
3028	2\0443\0444\0446-Tetrachlorophenol	\193g/L	UT
3029	2\0444\0445-T\193g/L	UT	
3030	2\0444\0445-TP (Silvex)	\193g/L	UT
3031	2\0444\0445-Trichlorophenol	\193g/L	UT
3032	2\0444\0446-Trichlorophenol	\193g/L	UT
3033	2\0444-D	\193g/L	UT
3034	2\0444-D and 2\0444\0445-T	\193g/L	UT
3035	2\0444-DB	\193g/L	UT
3036	2\0444-Dichlorophenol	\193g/L	UT
3037	2\0444-Dimethylphenol	\193g/L	UT

3038	2\0444-Dinitrophenol	\193g/L	UT		
3039	2\0444-Dinitrotoluene	\193g/L	UT		
3040	2\0444-D (Soil)	mg/kg	MGKG		
3041	2\0446-Dichlorophenol	\193g/L	UT		
3042	2\0446 Dinitrotoluene	\193g/L	UT		
3043	2-Butanone	\193g/L	UT		
3044	2-Chloroethylvinylether	\193g/L	UT		
3045	2-Chloronaphthalene	\193g/L	UT		
3046	2-Chlorophenol	\193g/L	UT		
3047	2-Chlorotoluene	\193g/L	UT		
3048	2-Dimethylbenz(a)anthracene	\193g/L	UT		
3049	2-Fluorophenol	\193g/L	UT		
3050	2-Hexanone	\193g/L	UT		
3051	2-Methylnaphthalene	\193g/L	UT		
3052	2-Methylphenol	\193g/L	UT		
3053	2-Nitroaniline	\193g/L	UT		
3054	2-Nitrophenol	\193g/L	UT		
3055	2-Picoline	\193g/L	UT		
3056	2-Propanone (Acetone)	\193g/L	UT		
3057	3\0443-Dichlorobenzidine	\193g/L	UT		
3058	3 & 4 Methyphenol	\193g/L	UT		
3059	3-Methylcholanthrene	\193g/L	UT		
3060	3-Methylphenol	\193g/L	UT		
3061	3-Nitroaniline	\193g/L	UT		
3062	4\0444'-DDD	\193g/L	UT		
3063	4\0444'-DDE	\193g/L	UT		
3064	4\0444'-DDT	\193g/L	UT		
3065	4-Aminobiphenyl	\193g/L	UT		
3066	4-Bromofluorobenzene	\193g/L	UT		
3067	4-Bromophenyl phenyl ether	\193g/L	UT		
3068	4-Chloro-3-Methylphenol	\193g/L	UT		
3069	4-Chloroaniline	\193g/L	UT		
3070	4-Chlorophenyl phenyl ether	\193g/L	UT		
3071	4-Chlorotoluene	\193g/L	UT		
3072	4-Isopropyltoluene	\193g/L	UT		

3073	4 Methyl-2-pentanone	\193g/L	UT		
3074	4-Methylphenol	\193g/L	UT		
3075	4-Nitroaniline	\193g/L	UT		
3076	4-Nitrophenol	\193g/L	UT		
3077	4-Nitroquinoline-N-oxide	\193g/L	UT		
3078	5-Nitro-o-toluidine	\193g/L	UT		
3079	7\04412-Dimethylbenz(a)anthracene	\193g/L	UT		
3080	7H-Dibenzo(c\044g)carbazole	\193g/L	UT		
3081	Abate	\193g/L	UT		
3082	Acenaphthene	\193g/L	UT		
3083	Acenaphthylene	\193g/L	UT		
3084	Acephate	\193g/L	UT		
3085	Acetophenone	\193g/L	UT		
3086	Acidity as CaCO3	mg/L	MGL		
3087	Acrolein	\193g/L	UT		
3088	Acrylonitrile	\193g/L	UT		
3089	Actinomycetes	CFU/100 mL	WISK		
3090	Aeromonas - presence/absence	---	SCAL		
3091	Aldicarb	\193g/L	UT		
3092	Aldrin	\193g/L	UT		
3093	Algae Bluegreen - Biovolume	mm\166/mL	WISK		
3094	Algae Bluegreen - Biovolume - Calculated	mm\166/L	WISK		
3095	Algae Bluegreen - Count and Identificati	cells/mL	WISK		
3096	Algae Bluegreen - Presence/absence	---	SCAL		
3097	Algae other than bluegreen - Count and I	cells/mL	WISK		
3098	Algae other than bluegreen - Presence/ab	---	SCAL		
3099	Algae Total - Count and Identification	cells/mL	WISK		
3100	Algae Total - Presence/absence	---	SCAL		
3101	Alkalinity as Bicarbonate (HCO3)	mg/L	MGL		
3102	Alkalinity as Carbonate (CO3)	mg/L	MGL		
3103	Alkalinity as Hydroxide (OH)	mg/L	MGL		
3104	Alkalinity (Bicarbonate) as CaCO3	mg/L	MGL		
3105	Alkalinity (Carbonate) as CaCO3	mg/L	MGL		
3106	Alkalinity (Hydroxide) as CaCO3	mg/L	MGL		
3107	Alkalinity (Residual) as Na2CO3	mg/L	MGL		

3108	Alkalinity (Total) as CaCO3	mg/L	MGL	
3109	Alpha Cypermethrin	\193g/L	UT	
3110	Alphamethrin	\193g/L	UT	
3111	Aluminium as Al - exchangeable		mg/L	MGL
3112	Aluminium as Al - non-filterable		mg/L	MGL
3113	Aluminium as Al - soluble	mg/L	MGL	
3114	Aluminium as Al - total	mg/L	MGL	
3115	Aminotriazole	\193g/L	UT	
3116	Amitraz	\193g/L	UT	
3117	Ammonia as N - free	mg/L	MGL	
3118	Ammonia as N - non filterable		mg/L	MGL
3119	Ammonia as N - soluble	mg/L	MGL	
3120	Ammonia as N - total	mg/L	MGL	
3121	Anaerobic Plate count	CFU/mL	WISK	
3122	Aniline	\193g/L	UT	
3123	Anthracene	\193g/L	UT	
3124	Antimony as Sb - non-filterable		mg/L	MGL
3125	Antimony as Sb - soluble	mg/L	MGL	
3126	Antimony as Sb - total	mg/L	MGL	
3127	Arochlor1016	\193g/L	UT	
3128	Arochlor1221	\193g/L	UT	
3129	Arochlor1232	\193g/L	UT	
3130	Arochlor1242	\193g/L	UT	
3131	Arochlor1248	\193g/L	UT	
3132	Arochlor1254	\193g/L	UT	
3133	Arochlor1260	\193g/L	UT	
3134	Arsenic as As - non-filterable	mg/L	MGL	
3135	Arsenic as As - soluble	mg/L	MGL	
3136	Arsenic as As - total	mg/L	MGL	
3137	Atrazine	\193g/L	UT	
3138	Atrazine (Soil)	mg/kg	MGKG	
3139	Azinphos (ethyl)	\193g/L	UT	
3140	Azinphos (methyl)	\193g/L	UT	
3141	Azobenzene	\193g/L	UT	
3142	Barium as Ba - non-filterable	mg/L	MGL	

3143	Barium as Ba - soluble	mg/L	MGL	
3144	Barium as Ba - total	mg/L	MGL	
3145	Baytan	\193g/L	UT	
3146	Baythroid	\193g/L	UT	
3147	Bendiocarb	\193g/L	UT	
3148	Benefin	\193g/L	UT	
3149	Benomyl	\193g/L	UT	
3150	Bentazon	\193g/L	UT	
3151	Benthiocarb (Thiobencarb)	\193g/L	UT	
3152	Benthiocarb (Thiobencarb) (Soil)	mg/kg	MGKG	
3153	Benzene	\193g/L	UT	
3154	Benzo(a)anthracene	\193g/L	UT	
3155	Benzo(a)pyrene	\193g/L	UT	
3156	Benzo(b)fluoranthene	\193g/L	UT	
3157	Benzo(b\044k)fluoranthene	\193g/L	UT	
3158	Benzo(ghi)perylene	\193g/L	UT	
3159	Benzo(j)fluoranthene	\193g/L	UT	
3160	Benzo(k)fluoranthene	\193g/L	UT	
3161	Benzsulfuron methyl	\193g/L	UT	
3162	Benzsulfuron methyl (Soil)	mg/kg	MGKG	
3163	Benzyl Alcohol	\193g/L	UT	
3164	Beryllium as Be	\193g/L	UT	
3165	BHC(alpha isomer)	\193g/L	UT	
3166	BHC(beta isomer)	\193g/L	UT	
3167	BHC(delta isomer)	\193g/L	UT	
3168	BHC(gamma isomer) - Lindane	\193g/L	UT	
3169	Bis(2-chloroethyl)ether	\193g/L	UT	
3170	Bis(2-chloroisopropyl)ether	\193g/L	UT	
3171	Bis(2-cloroethoxy)methane	\193g/L	UT	
3172	Bis(2-ethylhexyl) phthalate	\193g/L	UT	
3173	Bismuth as Bi - non-filterable	mg/L	MGL	
3174	Bismuth as Bi - soluble	mg/L	MGL	
3175	Bismuth as Bi - total	mg/L	MGL	
3176	Biochemical Oxygen Demand (BOD)	mg/L	MGL	
3177	Boron as B - soluble	mg/L	MGL	

3178	Boron as B - total	mg/L	MGL		
3179	Bromacil	\193g/L	UT		
3180	Bromide as Br	mg/L	MGL		
3181	Bromine as BrH	\193g/L	UT		
3182	Bromobenzene	\193g/L	UT		
3183	Bromochloromethane	\193g/L	UT		
3184	Bromodichloromethane	\193g/L	UT		
3185	Bromoform	\193g/L	UT		
3186	Bromomethane	\193g/L	UT		
3187	BTEX	\193g/L	UT		
3188	Butachlor	\193g/L	UT		
3189	Butane	\193g/L	UT		
3190	Butylbenzyl Phthalate	\193g/L	UT		
3191	Cadmium as Cd - non-filterable	mg/L	MGL		
3192	Cadmium as Cd - soluble	mg/L	MGL		
3193	Cadmium as Cd - total	mg/L	MGL		
3194	Calcium as Ca - exchangeable	cmol/kg	WISK		
3195	Calcium as Ca - soluble	mg/L	MGL		
3196	Calcium as Ca - total	mg/L	MGL		
3197	Calcium Carbonate Saturation Index	---	SCAL		
3198	Captan	\193g/L	UT		
3199	Carbaryl	\193g/L	UT		
3200	Carbazole	\193g/L	UT		
3201	Carbofuran	\193g/L	UT		
3202	Carbon-13	permil	PDB	WISK	
3203	Carbon-14	pMC	WISK		
3204	Carbon Dioxide as CO2	mg/L	MGL		
3205	Carbon disulfide	\193g/L	UT		
3206	Carbon Tetrachloride	\193g/L	UT		
3207	Carbon - total	mg/L	MGL		
3208	Cesium as Cs - non-filterable	mg/L	MGL		
3209	Cesium as Cs - soluble	mg/L	MGL		
3210	Cesium as Cs - total	mg/L	MGL		
3211	Chironomidae - Count and Identification	---	SCAL		
3212	Chironomidae - Presence/absence	---	SCAL		

3213	Chloranil	\193g/L	UT		
3214	Chlordane	\193g/L	UT		
3215	Chlordane (alpha)	\193g/L	UT		
3216	Chlordane (gamma)	\193g/L	UT		
3217	Chlorfenvinphos	\193g/L	UT		
3218	Chlorfluazuron	\193g/L	UT		
3219	Chloride as Cl	mg/L	MGL		
3220	Chlorine as Cl2 - combined	mg/L	MGL		
3221	Chlorine as Cl2 - free	mg/L	MGL		
3222	Chlorine as Cl2 - residual	mg/L	MGL		
3223	Chlorine as Cl2 - total	mg/L	MGL		
3224	Chlorobenzene	\193g/L	UT		
3225	Chlorobenzilate	\193g/L	UT		
3226	Chlorodibromomethane	\193g/L	UT		
3227	Chloroethane	\193g/L	UT		
3228	Chloroform	\193g/L	UT		
3229	Chloromethane	\193g/L	UT		
3230	Chlorophyll-a	\193g/L	UT		
3231	Chlorophyll-a (HydroLab)	\193g/L	UT		
3232	Chlorophyll-a (Lorenzen)	\193g/L	UT		
3233	Chlorophyll a (UNESCO)	\193g/L	UT		
3234	Chlorophyll-a voltage (HydroLab)	mV	MV		
3235	Chlorophyll-b	\193g/L	UT		
3236	Chlorophyll-c	\193g/L	UT		
3237	Chlorothalonil	\193g/L	UT		
3238	Chlorpyrifos	\193g/L	UT		
3239	Chlorpyrifos-methyl	\193g/L	UT		
3240	Chlorpyrifos (Soil)	mg/kg	MGKG		
3241	Chromium as Cr - non-filterable	mg/L	MGL		
3242	Chromium as Cr - soluble	mg/L	MGL		
3243	Chromium as Cr - total	mg/L	MGL		
3244	Chromium Hexavalent	mg/L	MGL		
3245	Chrysene	\193g/L	UT		
3246	cis-1\0442-Dichloroethene	\193g/L	UT		
3247	Cis-1\0443-dichloropropene	\193g/L	UT		

3248	Cis-isosafrole	\193g/L	UT	
3249	Clay/Silt (% tot part <= 63 um)		%	PERC
3250	Cobalt as Co - non-filterable	mg/L	MGL	
3251	Cobalt as Co - soluble	mg/L	MGL	
3252	Cobalt as Co - total	mg/L	MGL	
3253	Chemical Oxygen Demand (COD)		mg/L	MGL
3254	Chemical Oxygen Demand filtered		mg/L	MGL
3255	Colour - Apparent	---	SCAL	
3256	Colour - True	---	SCAL	
3257	Copper as Cu - non-filterable	mg/L	MGL	
3258	Copper as Cu - soluble	mg/L	MGL	
3259	Copper as Cu - total	mg/L	MGL	
3260	Coronene	\193g/L	UT	
3261	Coumaphos	\193g/L	UT	
3262	Cyanide as CN - Free	\193g/L	UT	
3263	Cyanide as CN - total	mg/L	MGL	
3264	Cyfluthrin	\193g/L	UT	
3265	Cypermethrin	\193g/L	UT	
3266	DCPA	\193g/L	UT	
3267	Deltamethrin	\193g/L	UT	
3268	Demeton O&S	\193g/L	UT	
3269	Demeton-S-methyl	\193g/L	UT	
3270	Demeton-S-methyl (Soil)		mg/kg	MGKG
3271	Desethyl Atrazine	\193g/L	UT	
3272	Detergents	mg/L	MGL	
3273	Deuterium (2H)	permil	VSMOW	WISK
3274	di(2-ethylhexyl)adipate	\193g/L	UT	
3275	di(2-ethylhexyl)phthalate	\193g/L	UT	
3276	Di-allate	\193g/L	UT	
3277	Diazinon	\193g/L	UT	
3278	Diazinon (Soil)	mg/kg	MGKG	
3279	Dibenz(a\044h)acridine	\193g/L	UT	
3280	Dibenz(a\044h)anthracene	\193g/L	UT	
3281	Dibenz(a\044j)acridine	\193g/L	UT	
3282	Dibenzo(a\044e)pyrene	\193g/L	UT	

3283	Dibenzo(a\044h)pyrene	\193g/L	UT	
3284	Dibenzo(a\044i)pyrene	\193g/L	UT	
3285	Dibenzofuran	\193g/L	UT	
3286	Dibromochloromethane	\193g/L	UT	
3287	Dibromomethane	\193g/L	UT	
3288	Dicamba	\193g/L	UT	
3289	Dichlorobenzidine	\193g/L	UT	
3290	Dichloromethane	\193g/L	UT	
3291	Dichlorvos	\193g/L	UT	
3292	Dicofol (Kelthane)	\193g/L	UT	
3293	Dieldrin	\193g/L	UT	
3294	Diethyl Phthalate	\193g/L	UT	
3295	Dimethipin	\193g/L	UT	
3296	Dimethoate	\193g/L	UT	
3297	Dimethoate (Soil)	mg/kg	MGKG	
3298	Dimethylaminoazobenzene	\193g/L	UT	
3299	Dimethyl Phthalate	\193g/L	UT	
3300	Di-n-butyl phthalate	\193g/L	UT	
3301	Di-n-octyl phthalate	\193g/L	UT	
3302	Di-n-octyl phthalate	\193g/L	UT	
3303	Diphenylamine	\193g/L	UT	
3304	Diquat Dibromide	\193g/L	UT	
3305	Dissolved Organic Carbon	mg/L	MGL	
3306	Dissolved Organic Halogen	mg/L	MGL	
3307	Disulfoton	\193g/L	UT	
3308	Disulfoton (Soil)	mg/kg	MGKG	
3309	Diuron	\193g/L	UT	
3310	Diuron (Soil)	mg/kg	MGKG	
3311	DSMA	\193g/L	UT	
3312	E. coli - membrane filtration count	CFU/100 mL	WISK	
3313	E. coli - most probable number	MPN/100 mL	WISK	
3314	Endosulfan (alpha isomer)	\193g/L	UT	
3315	Endosulfan (alpha isomer) (Soil)	mg/kg	MGKG	
3316	Endosulfan (beta isomer)	\193g/L	UT	
3317	Endosulfan (beta isomer) (Soil)	mg/kg	MGKG	

3318	Endosulfan sulfate	\193g/L	UT		
3319	Endosulfan sulfate (Soil)	mg/kg	MGKG		
3320	Endothal	\193g/L	UT		
3321	Endrin	\193g/L	UT		
3322	Endrin aldehyde	\193g/L	UT		
3323	Enterococci - membrane filtration count			CFU/100 mL	WISK
3324	Esfenvalerate	\193g/L	UT		
3325	Ethane	\193g/L	UT		
3326	Ethene	\193g/L	UT		
3327	Ethion	\193g/L	UT		
3328	Ethylbenzene	\193g/L	UT		
3329	Ethyl methanesulfonate	\193g/L	UT		
3330	Faecal Coliform - membrane filtration co			CFU/100 mL	WISK
3331	Faecal Coliform - most probable number			MPN/100 mL	WISK
3332	Faecal Streptococci - membrane filtratio			CFU/100 mL	WISK
3333	Faecal Streptococci - most probable numb			MPN/100 mL	WISK
3334	Fenthion	\193g/L	UT		
3335	Fenvalerate	\193g/L	UT		
3336	Fipronil	\193g/L	UT		
3337	Fish - Count and Identification		---	SCAL	
3338	Fish - Presence/absence	---	SCAL		
3339	Flow - annual volume ML	ML			
3340	Flow - monthly max. inst.	ML/d	MLD		
3341	Flow - monthly min. inst.	ML/d	MLD		
3342	Flow - monthly volume	ML	ML		
3343	Fluazifop	\193g/L	UT		
3344	Fluazifop-P-butyl	\193g/L	UT		
3345	Fluometuron	\193g/L	UT		
3346	Fluoranthene	\193g/L	UT		
3347	Fluorene	\193g/L	UT		
3348	Fluoride as F - soluble	mg/L	MGL		
3349	Fluoride as F - total	mg/L	MGL		
3350	Fluvalinate	\193g/L	UT		
3351	Folex - Merphos	\193g/L	UT		
3352	Formothion	\193g/L	UT		

3353	Gallionella spp	CFU/mL	WISK		
3354	Glyphosate	\193g/L	UT		
3355	Gold as Au - non-filterable	mg/L	MGL		
3356	Gold as Au - soluble	mg/L	MGL		
3357	Gold as Au - total	mg/L	MGL		
3358	Gravel (% tot part > 2000 um)	%	PERC		
3359	Haloxyfop	\193g/L	UT		
3360	Hardness as CaCO3 (calculated)	mg/L	MGL		
3361	Hardness as CaCO3 (measured)	mg/L	MGL		
3362	Height - Water Column	m	M		
3363	Heptachlor	\193g/L	UT		
3364	Heptachlor epoxide	\193g/L	UT		
3365	Heterotrophic Plate Count	CFU/mL	WISK		
3366	Hexachlorobenzene	\193g/L	UT		
3367	Hexachlorobutadiene	\193g/L	UT		
3368	Hexachlorocyclopentadiene	\193g/L	UT		
3369	Hexachloroethane	\193g/L	UT		
3370	Hexachloropropylene	\193g/L	UT		
3371	HPLC (peptic toxin analysis by High Perf	---	SCAL		
3372	Hydrogen as H	mg/L	MGL		
3373	Hydrogen Sulfide as H2S - dissolved	\193g/L	UT		
3374	Hydroxy Atrazine	\193g/L	UT		
3375	Indeno(1\0442\0443-cd)pyrene	\193g/L	UT		
3376	Iodide as I	mg/L	MGL		
3377	Iodine as I	mg/L	MGL		
3378	Iprodione	\193g/L	UT		
3379	Iron as Fe2+ - exchangeable	mg/L	MGL		
3380	Iron as Fe2+ - soluble	mg/L	MGL		
3381	Iron as Fe3+ - exchangeable	mg/L	MGL		
3382	Iron as Fe - exchangeable	mg/L	MGL		
3383	Iron as Fe - non-filterable	mg/L	MGL		
3384	Iron as Fe - soluble	mg/L	MGL		
3385	Iron as Fe - total	mg/L	MGL		
3386	Iron Bacteria - presence/absence	---	SCAL		
3387	Iron depositing Bacteria	CFU/mL	WISK		

3388	Isophorone	\193g/L	UT			
3389	Isopropylbenzene	\193g/L	UT			
3390	Lambdacyhalothrin	\193g/L	UT			
3391	Langlier Index	---	SCAL			
3392	Lead as Pb - non-filterable	mg/L	MGL			
3393	Lead as Pb - soluble	mg/L	MGL			
3394	Lead as Pb - total	mg/L	MGL			
3395	Level - Full Supply (FSL Percentage) - T	%	PERC			
3396	Level - Lake	m	M			
3397	Level - Reservoir Water AHD	m AHD	WISK			
3398	Level - Tank	m	M			
3399	Level - Tide	m	M			
3400	Lignins	mg/L	MGL			
3401	Linuron	\193g/L	UT			
3402	Lithium as Li - non-filterable	mg/L	MGL			
3403	Lithium as Li - soluble	mg/L	MGL			
3404	Lithium as Li - total	mg/L	MGL			
3405	Loss on drying @ 105 C	%	PERC			
3406	Loss on drying @ 180 C	%	PERC			
3407	Loss on ignition @ 550 C	%	PERC			
3408	Macroinvertbrates - Count and Identifica	---	SCAL			
3409	Macroinvertbrates - Presence/absence	---	SCAL			
3410	Macrophytes - Cover	%	PERC			
3411	Macrophytes - Cover - Emergents	%	PERC			
3412	Macrophytes - Cover - Floating	%	PERC			
3413	Macrophytes - Cover - Submerged	%	PERC			
3414	Macrophytes - Ranking	---	SCAL			
3415	Magnesium as Mg - exchangeable	cmol/kg	WISK			
3416	Magnesium as Mg - non-filterable	mg/L	MGL			
3417	Magnesium as Mg - soluble	mg/L	MGL			
3418	Magnesium as Mg - total	mg/L	MGL			
3419	Malathion	\193g/L	UT			
3420	Malathion (Soil)	mg/kg	MGKG			
3421	Maneb	\193g/L	UT			
3422	Manganese as Mn - non-filterable	mg/L	MGL			

3423	Manganese as Mn - soluble	mg/L	MGL	
3424	Manganese as Mn - total	mg/L	MGL	
3425	Maximum Relative Humidity	%	PERC	
3426	MCPA \193g/L	UT		
3427	MCPA (Soil)	mg/kg	MGKG	
3428	m-Cresol	\193g/L	UT	
3429	Mecoprop	\193g/L	UT	
3430	Mercury as Hg - inorganic	mg/L	MGL	
3431	Mercury as Hg - organic	mg/L	MGL	
3432	Mercury as Hg - soluble	mg/L	MGL	
3433	Mercury as Hg - total	mg/L	MGL	
3434	meta Xylene	\193g/L	UT	
3435	Methamidophos	\193g/L	UT	
3436	Methane	\193g/L	UT	
3437	Methapyriline	\193g/L	UT	
3438	Methiocarb	\193g/L	UT	
3439	Methomyl	\193g/L	UT	
3440	Methoxychlor	\193g/L	UT	
3441	Methylene blue active substances	mg/L	MGL	
3442	Methyl methanesulfonate	\193g/L	UT	
3443	Metolachlor	\193g/L	UT	
3444	Metolachlor (Soil)	mg/kg	MGKG	
3445	Metsulfuron methyl	\193g/L	UT	
3446	Mevinphos	\193g/L	UT	
3447	Microfungae	CFU/100 mL	WISK	
3448	Minimum Relative Humidity	%	PERC	
3449	Mirex \193g/L	UT		
3450	Moisture - Surface	%	PERC	
3451	Molinate	\193g/L	UT	
3452	Molinate (Soil)	mg/kg	MGKG	
3453	Molybdenum as Mo - non-filt	mg/L	MGL	
3454	Molybdenum as Mo - soluble	mg/L	MGL	
3455	Molybdenum as Mo - total	mg/L	MGL	
3456	Monocrotophos	\193g/L	UT	
3457	Mouse bioassay/toxicity	---	SCAL	

3458	m + p Xylene	\193g/L	UT	
3459	N-2-fluorenylacetamide	\193g/L	UT	
3460	Naphthalene	\193g/L	UT	
3461	n-Butylbenzene	\193g/L	UT	
3462	Nickel as Ni - non-filterable	mg/L	MGL	
3463	Nickel as Ni - soluble	mg/L	MGL	
3464	Nickel as Ni - total	mg/L	MGL	
3465	Nitrate + nitrite as N (NOx)	mg/L	MGL	
3466	Nitrate as N	mg/L	MGL	
3467	Nitrate - extractable	mg/L	MGL	
3468	Nitrate Reducing Bacteria	CFU/mL	WISK	
3469	Nitrite + Nitrate - extractable	mg/L	MGL	
3470	Nitrite as N	mg/L	MGL	
3471	Nitrobacter - presence/absence	---	SCAL	
3472	Nitrobenzene	\193g/L	UT	
3473	Nitrogen-15	permilAir	WISK	
3474	Nitrogen - albuminoid	mg/L	MGL	
3475	Nitrogen - albuminoid filtered	mg/L	MGL	
3476	Nitrogen - detrital	mg/L	MGL	
3477	Nitrogen - inorganic	mg/L	MGL	
3478	Nitrogen - Kjeldahl	mg/L	MGL	
3479	Nitrogen - organic	mg/L	MGL	
3480	Nitrogen - total	mg/L	MGL	
3481	Nitrogen - total dissolved	mg/L	MGL	
3482	Nitrogen - total (soil)	mg/kg	MGKG	
3483	Nitrosomonas - presence/absence	---	SCAL	
3484	N-Nitrosodibutylamine	\193g/L	UT	
3485	N-Nitrosodiethylamine	\193g/L	UT	
3486	N-Nitrosodimethylamine	\193g/L	UT	
3487	N-Nitrosodiphenylamine	\193g/L	UT	
3488	N-Nitrosodiphenyl & Diphenylamine	\193g/L	UT	
3489	N-nitroso-dipropylamine	\193g/L	UT	
3490	N-Nitrosomorpholine	\193g/L	UT	
3491	N-Nitrosopiperidine	\193g/L	UT	
3492	N-Nitrosopyrrolidine	\193g/L	UT	

3493	n-Propylbenzene	\193g/L	UT			
3494	o-Cresol	\193g/L	UT			
3495	Oil and Grease	mg/L	MGL			
3496	Omethoate	\193g/L	UT			
3497	Omite (propargite)	\193g/L	UT			
3498	Organic Acids	mg/L	MGL			
3499	Oxamyl	\193g/L	UT			
3500	Oxyfluorfen	\193g/L	UT			
3501	Oxygen-18	permil	VSMOW	WISK		
3502	Oxygen-18 (180)	ppt	PPT			
3503	o-Xylene	\193g/L	UT			
3504	Paraquat	\193g/L	UT			
3505	Parathion (ethyl)	\193g/L	UT			
3506	Parathion (ethyl) (Soil)	mg/kg	MGKG			
3507	Parathion (methyl)	\193g/L	UT			
3508	Parathion (methyl) (Soil)	mg/kg	MGKG			
3509	para Xylene	\193g/L	UT			
3510	p-Cresol	\193g/L	UT			
3511	Pendimethalin	\193g/L	UT			
3512	Pendimethalin (Soil)	mg/kg	MGKG			
3513	Pentachlorobenzene	\193g/L	UT			
3514	Pentachloronitrobenzene	\193g/L	UT			
3515	Pentachlorophenol	\193g/L	UT			
3516	Permethrin	\193g/L	UT			
3517	Perylene	\193g/L	UT			
3518	Phaeophytin	\193g/L	UT			
3519	Phenacetin	\193g/L	UT			
3520	Phenanthrene	\193g/L	UT			
3521	Phenol	\193g/L	UT			
3522	Phorate	\193g/L	UT			
3523	Phorate (Soil)	mg/kg	MGKG			
3524	Phosphatase inhibition - toxocity test	f	---	SCAL		
3525	Phosphorus - acid extractable	mg/kg	MGKG			
3526	Phosphorus - acid hydrolysable - dissolv	mg/L	MGL			
3527	Phosphorus - acid hydrolysable - total	mg/L	MGL			

3528	Phosphorus - dissolved organic	mg/L	MGL
3529	Phosphorus - extractable	mg/kg	MGKG
3530	Phosphorus Fixing Capacity	mg/kg	MGKG
3531	Phosphorus - reactive (orthophosphate) -	mg/L	MGL
3532	Phosphorus - reactive (orthophosphate) -	mg/L	MGL
3533	Phosphorus Sorption Index	---	SCAL
3534	Phosphorus - total	mg/L	MGL
3535	Phosphorus - total dissolved	mg/L	MGL
3536	Phosphorus - total organic	mg/L	MGL
3537	Photosynthetically Active Radiation	umol/m\166s	WISK
3538	Phycocyanin voltage	mV	MV
3539	Pirimiphos-ethyl	\193g/L	UT
3540	Potassium-40 Beta	Bq/L	BL
3541	Potassium as K - exchangable	mg/L	MGL
3542	Potassium as K - soluble	mg/L	MGL
3543	Potassium as K - total	mg/L	MGL
3544	Profenofos	\193g/L	UT
3545	Profenofos (Soil)	mg/kg	MGKG
3546	Promecarb	\193g/L	UT
3547	Prometon	\193g/L	UT
3548	Prometryn	\193g/L	UT
3549	Prometryn (Soil)	mg/kg	MGKG
3550	Pronamide	\193g/L	UT
3551	Propane	\193g/L	UT
3552	Propazine	\193g/L	UT
3553	Propene	\193g/L	UT
3554	Propoxur	\193g/L	UT
3555	Prothiofos	\193g/L	UT
3556	Pseudomonas aeruginosa - membrance filtr	CFU/100 mL	WISK
3557	Pseudomonas aeruginosa - most probable n	CFU/100 mL	WISK
3558	Pyrene	\193g/L	UT
3559	Radiation - Alpha	mBq/L	MBPL
3560	Radiation - Beta	mBq/L	MBPL
3561	Radiation - Gamma	mBq/L	MBPL
3562	Radiation - Tritium	mBq/L	MBPL

3563	Radiocarbon age	year (Julian)	YR			
3564	Radon-222	Bq/L	BL			
3565	Rainfall - Day	mm	MM			
3566	Rainfall - Month	mm	MM			
3567	Oxygen Reduction Pot (REDOX)			mV	MV	
3568	Relative Humidity (Corrected)			%	PERC	
3569	Riparian vegetation - Count and Identifi			---	SCAL	
3570	Riparian vegetation - Presence/absence			---	SCAL	
3571	Riperian vegetation - Cover	%	PERC			
3572	Rubidium-Rb	\193g/L	UT			
3573	Safrole	\193g/L	UT			
3574	Salinity	ppt	PPT			
3575	Salmonella - membrane filtration count			CFU/100 mL	WISK	
3576	Salmonella - most probable number			MPN/100 mL	WISK	
3577	Salmonella - presence/absence			---	SCAL	
3578	Salt Load Rate	t/s	TONS			
3579	Salt Load Total	t	TONN			
3580	Sand (% tot part >= 200 um)	%	PERC			
3581	Sand (% tot part <=2000 um)	%	PERC			
3582	Sand (% tot part <= 200 um)	%	PERC			
3583	sec-Butylbenzene	\193g/L	UT			
3584	Sediment Transport Rate	t/s	TONS			
3585	Selenium as Se - non-filterable			mg/L	MGL	
3586	Selenium as Se - soluble	mg/L	MGL			
3587	Selenium as Se - total	mg/L	MGL			
3588	Silica as Si02 - soluble	mg/L	MGL			
3589	Silica as SiO2 - reactive	mg/L	MGL			
3590	Silica as SiO2 - soluble	mg/L	MGL			
3591	Silica as SiO2 - total	mg/L	MGL			
3592	Silicon as Si - soluble	mg/L	MGL			
3593	Silver as Ag - non-filterable	mg/L	MGL			
3594	Silver as Ag - soluble	mg/L	MGL			
3595	Silver as Ag - total	mg/L	MGL			
3596	Simazine	\193g/L	UT			
3597	Sodium Adsorption Ratio	---	SCAL			

3598	Sodium Adsorption Ratio- adjusted			---	SCAL	
3599	Sodium as Na - exchangeable			mg/L	MGL	
3600	Sodium as Na - soluble		mg/L	MGL		
3601	Sodium as Na - total	mg/L	MGL			
3602	Solar Radiation - Total		Wh/m\166		WHSM	
3603	Solids - fixed	mg/L	MGL			
3604	Solids - percent @ 105 C		%	PERC		
3605	Solids - settleable	mg/L	MGL			
3606	Solids - total @ 105 C	mg/L	MGL			
3607	Solids - total @ 180 C	mg/L	MGL			
3608	Solids - total dissolved @ 105 C			mg/L	MGL	
3609	Solids - total dissolved @ 180 C			mg/L	MGL	
3610	Solids - total dissolved (calculated)			mg/L	MGL	
3611	Solids - total volatile	mg/L	MGL			
3612	Solids - volatile dissolved		mg/L	MGL		
3613	Solids - volatile suspended		mg/L	MGL		
3614	Specific Gravity	g/mL	GM			
3615	Sphaerotilus spp	CFU/mL		WISK		
3616	S\044S\044S-Tributylphosphortrithioate(Degreen			\193g/L		UT
3617	Station Level Pressure (barometer)			hPa	HPA	
3618	Strontium-87/Strontium-86 ratio			\193g/L		UT
3619	Strontium as Sr - non-filterable			mg/L	MGL	
3620	Strontium as Sr - soluble		mg/L	MGL		
3621	Strontium as Sr - total	mg/L	MGL			
3622	Styrene	\193g/L	UT			
3623	Sulfotep - dithione	\193g/L		UT		
3624	Sulphate as S	mg/L	MGL			
3625	Sulphate as SO4	mg/L	MGL			
3626	Sulphate Reducing Bacteria		CFU/100 mL		WISK	
3627	Sulphide as S	mg/L	MGL			
3628	Sulphite as S	mg/L	MGL			
3629	Sulphite as SO3	mg/L	MGL			
3630	Sulphite Reducing Bacteria		CFU/100 mL		WISK	
3631	Sulphur-34	permilV-CD	WISK			
3632	Sulphur Bacteria - presence/absence			---	SCAL	

3633	Sulprofos	\193g/L	UT			
3634	Sulprofos (Soil)	mg/kg	MGKG			
3635	Tannins	mg/L	MGL			
3636	TCA	\193g/L	UT			
3637	Temperature - Dew Point	\166C	DEGC			
3638	Temperature - Water Correction Factor			---	SCAL	
3639	Temperature - Wet Bulb	\166C	DEGC			
3640	tert-Butylbenzene	\193g/L	UT			
3641	Tetrachloroethene	\193g/L	UT			
3642	Tetrachloroethylene	\193g/L	UT			
3643	Tetrachloronaphalene	\193g/L	UT			
3644	Thidiazuron	\193g/L	UT			
3645	Thiobacillus - presence/absence			---	SCAL	
3646	Thiocyanate as SCN-	\193g/L	UT			
3647	Thiodicarb	\193g/L	UT			
3648	Thiometon	\193g/L	UT			
3649	Thiometon (Soil)	mg/kg	MGKG			
3650	Thiram	\193g/L	UT			
3651	Tin as Sn - non-filterable	mg/L	MGL			
3652	Tin as Sn - organic	mg/L	MGL			
3653	Tin as Sn - soluble	mg/L	MGL			
3654	Tin as Sn - total	mg/L	MGL			
3655	Titanium as Ti - non-filterable	mg/L	MGL			
3656	Titanium as Ti - soluble	mg/L	MGL			
3657	Titanium as Ti - total	mg/L	MGL			
3658	Total Organic Carbon (TOC)	mg/L	MGL			
3659	TOC Permanganate Value	mg/L	MGL			
3660	Total Organic Carbon (TOC) (Soil)			% w/w	WISK	
3661	Toluene	\193g/L	UT			
3662	Total benzoic acid type herbicides			\193g/L	UT	
3663	Total Carbamates	\193g/L	UT			
3664	Total Chlorophenol	\193g/L	UT			
3665	Total Chlorophyll	\193g/L	UT			
3666	Total Coliform - membrane filtration cou			CFU/100 mL	WISK	
3667	Total Coliform - most probable number			MPN/100 mL	WISK	

3668	Total DDT	\193g/L	UT		
3669	Total dipyridyls	\193g/L	UT		
3670	Total Inorganic Carbon	mg/L	MGL		
3671	Total Organochlorines	\193g/L	UT		
3672	Total Organophosphates	\193g/L	UT		
3673	Total Petroleum Hydrocarbons	mg/L	MGL		
3674	Total Petroleum Hydrocarbons (C10 - C14	mg/L	MGL		
3675	Total Petroleum Hydrocarbons C10-C14 fra	mg/L	MGL		
3676	Total Petroleum Hydrocarbons (C14 - C24	mg/L	MGL		
3677	Total Petroleum Hydrocarbons C15-C28 fra	mg/L	MGL		
3678	Total Petroleum Hydrocarbons (C24 - C32	mg/L	MGL		
3679	Total Petroleum Hydrocarbons C29-C36 fra	mg/L	MGL		
3680	Total Petroleum Hydrocarbons (C32 - C36	mg/L	MGL		
3681	Total Petroleum Hydrocarbons (C 5 - C10	mg/L	MGL		
3682	Total Petroleum Hydrocarbons C6-C9 fract	mg/L	MGL		
3683	Total phenyl ureas	\193g/L	UT		
3684	Total Polychlorinated Biphenyls	\193g/L	UT		
3685	Total Polycyclic Aromatic Hydrocarbons	\193g/L	UT		
3686	Total Pyrethroids	\193g/L	UT		
3687	Total triazines	\193g/L	UT		
3688	Total volatile halocarbons	\193g/L	UT		
3689	Toxaphene	\193g/L	UT		
3690	Toxaphene; Chlordane; Endrin	\193g/L	UT		
3691	Trans-1\0442-dichloroethene	\193g/L	UT		
3692	Trans-1\0443-dichloropropene	\193g/L	UT		
3693	Trans-isosafrole	\193g/L	UT		
3694	Transmissivity	%	PERC		
3695	Transparency (secchi depth)	m	M		
3696	Trichlorfon	\193g/L	UT		
3697	Trichlorfon (Soil)	mg/kg	MGKG		
3698	Trichloroethene	\193g/L	UT		
3699	Trichloroethylene	\193g/L	UT		
3700	Trichlorofluoromethane	\193g/L	UT		
3701	Trifluralin	\193g/L	UT		
3702	Trifluralin (Soil)	mg/kg	MGKG		

3703	Trihalomethanes	\193g/L	UT		
3704	Tritium (3H)	TU	WISK		
3705	Tube Release	ML	ML		
3706	Uranium	ppb	PPB		
3707	Uranium (234)/Uranium (238) ratio			---	SCAL
3708	Vanadium as V - non-filterable			mg/L	MGL
3709	Vanadium as V - soluble		mg/L	MGL	
3710	Vanadium as V - total		mg/L	MGL	
3711	Vinyl Acetate	\193g/L	UT		
3712	Vinyl Chloride	\193g/L	UT		
3713	Viruses	org/100 mL	WISK		
3714	Viscosity	Pa s	PAS		
3715	Volatile fatty acids		mg/L	MGL	
3716	Zinc as Zn - non-filterable		mg/L	MGL	
3717	Zinc as Zn - soluble		mg/L	MGL	
3718	Zinc as Zn - total		mg/L	MGL	
3719	Zineb	\193g/L	UT		
3720	Zirconium as Zr - non-filterable			mg/L	MGL
3721	Zirconium as Zr - soluble		mg/L	MGL	
3722	Zirconium as Zr - total		mg/L	MGL	
3723	Zooplankton - Count and Identification			---	SCAL
3724	Zooplankton - Presence/absence			---	SCAL
3725	Barometric Pressure	mbar	MBAR		

Appendix C - PINNEENA 11.1 Short Cut Keys

From the Menu screens

<**F1**>	Help - allows you to browse the documentation for the program highlighted
<**F8**>	Rerun - will restore the last parameter screen for the program highlighted
<**F9**>	DOS - will shell you to DOS
<**Esc**>	Abort - will exit from the current menu screen

From the Parameter screens

<**F1**>	Help - will give information about the field if available
<**F2**>	Lookup - will allow you to select from a lookup table
<**Enter**>	Execute the program (Standard Windows definition)
<🡅>	Up Arrow - will move the cursor to the next line up,
<🡇>	Down Arrow - will move the cursor to the next line down,
<🡄 🡆>	Across Arrows - will move the cursor sideways in a field
	Across Arrows - at either end of the field will move cursor to the next field
<**Esc**>	Abort - will exit from the parameter screen, and
<TAB>	Move you forward through the data
<SHIFT><TAB>	The Shift -Tab combinations move the cursor back through the data

From Database screens

<**Ctrl-P**>	Print - allows you to print the screen or the database
< **Ctrl-B**>	Browse – toggles between table and form views
< **Ctrl-F**>	Find - allows for searches on the gauging site number only
<**Tab**>	Move - moves the cursor between database windows (where applicable)
<**Home**>	Top - moves to the first record
<**End**>	Bottom - moves to the last record
<**PgUp**>	When in table view, moves up 20 records
<**PgDn**>	When in table view, moves down 20 records
<🡇>	Next - moves to the next record
<🡅>	Previous - moves to the previous record

Appendix D - Product Evaluation

To enable us to keep you up to date with product enhancements, we ask that you take the time to fill in both pages of this evaluation report. The first page requires details of your hardware and applications. This information, together with your address , will enable us to keep you informed about product development as well as being a handy reference for our help desk.

The second page is a product evaluation. We would appreciate your comments on the programs and documentation, once you have explored PINNEENA GW 10.1 and have some experience with its use.

PINNEENA EVALUATION		
Organization	**Address**	
…… …… …… ……	…… … …… …. …… …. …… …..	
Contact Person	**Phone**	**Fax**
…… …… ……	(.....).....	(.....).....
E-Mail		
Computer System (tick first line)		
OS: 2000..... XP……VISTA..... Win 7..... Win 8/8.1..... CPU Type: Pentium III/IV…..DUAL Core…..Quad Core…… 64 BIT……. 32 BIT…….. AMD32…….. AMD64…… CPU Speed:……..MHz RAM:……Mb Hard Disk Size……..Mb		
Program Use (e.g. research, consulting, etc.)		
…… . ……		

Experience	**Yes/No**	**Number of Years?**	**Comment**
Are you experienced with HYDSTRA software?			
Are you familiar with PCs and the Windows OS?			
Are you experienced in Hydrogeology?			
Are you experienced with Mapping programs?			
System Use	**Yes/No**	**Comment**	

PINNEENA EVALUATION		
Do you use other Hydrological or Statistical Packages ? If so what package?		…… …. …… …. …… …..
Is it easy to transfer data to this package?		…… ….. …… ……
Do you use the HYDDE or HYDLL programmatic access to data?		…… …… …… ……

How do you access the data? Please tick main access	**MapHYD**		**HYDSTRA Plot Programs**	
	Precomputed Reports		**HYDSTRA Report Programs**	

HYDSTRA Use	**Yes/No**	**Comment**
Do you use the Pre-computed Reports in MapHYD ?		…… …. …… …. …… ….
Would you like to see other reports in this section ?		…… …. …… …. …… ….
Did you find the general HYDSTRA programs easy to use ?		…… …. …… …. …… …..
Is there enough help to enable you to use the programs ?		…… …. …… …. …… ….
Have you had any problems running particular programs ?		…… …. …… …. …… …..

PINNEENA EVALUATION		
Have you any other suggestions or comments ?		…… …. …… …. …… …. …… …. …… ….. …… …
Documentation Evaluation	**Comment**	
What was your initial impressions of the documentation and product?	…… … …… …. …… …..	
How often (and why) do you need to refer to the documentation?	…… … …… …. …… …. …… …..	
Any other comments or suggestions regarding documentation?	…… … …… …. …… …..	

Please return this evaluation to:

Water Information Systems Manager

NSW Office of Water

PO Box 3720, Parramatta NSW 2124

Or email a copy to: waterinfo@water.nsw.gov.au